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THE POTATO-MOTH.

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A VERY severe outbreak of the potato-moth (*Gelechia operculella*)* has been experienced in the South Island, and the present crop has in certain localities been very materially affected. This insect is especially prevalent in North Otago and Canterbury, two of the most important potato-growing districts of the Dominion. Recently I examined on the Wellington wharf several lines of potatoes, totalling some seven hundred sacks, which had been shipped from Oamaru. All these lines were badly infected with the moth, in various stages from newly hatched to adult and pupating larvæ. Many other samples of affected potatoes have been received from localities as widely separated as Christchurch and Oamaru, showing that the pest is well distributed and not restricted to any special district. Some seventeen years ago the South Island crop was seriously affected, but between that date and this season the potato-moth has not been reported as causing any appreciable loss in the South Island, although it has long been recognized as a serious and annually recurring potato trouble in the North.

* Also known as *Lita solanella*, *Gelechia solanella*, and *Phthorimaea operculella*.

THE DISTRIBUTION OF THE MOTH.

According to Meyrick the potato-moth was probably originally a native of northern Africa, feeding on a variety of plants until, on the introduction of the potato into the Old World, it transferred its attention almost entirely to that crop. At the present day it is in many countries the most serious insect enemy of the potato, not excepting even the famous Colorado beetle (*Lepinotarsa decemlineata*). The potato-moth is especially serious in the Mediterranean regions, South Africa, California, and Australasia. In Tasmania and many parts of the Australian mainland it annually occasions great loss and seriously depreciates the crop, especially after it has been stored. In New Zealand it is now widespread throughout the North Island, and in the South as far as Dunedin. The important potato-growing areas in Southland are apparently as yet free, but it is only a matter of time before the moth will be prevalent as far south as the potato is grown.

DAMAGE CAUSED.

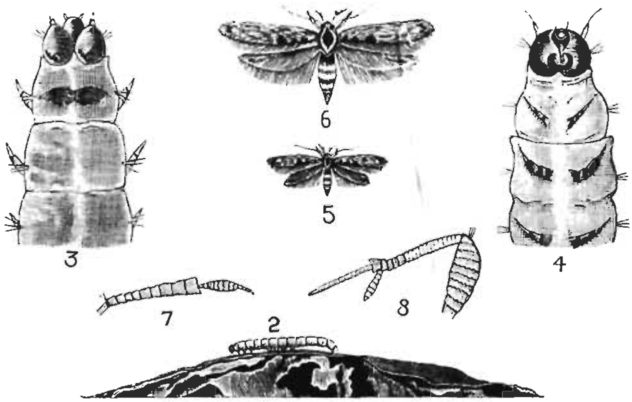
The tubers are the parts chiefly affected, becoming tunnelled with the galleries of the larvæ of the moth and rendered unfit for consumption. Some may be affected before the tubers are lifted, but the majority of the damage is caused after the crop has been harvested. Affected tubers frequently rot in storage, especially if they are not kept quite dry, and the rot may be spread rapidly under humid warm conditions and involve tubers that would otherwise remain sound. If no methods for control are adopted it is not unusual for the entire crop to become riddled and rendered completely useless. The potato-moth can live on other plants besides the potato, such as many solanaceous plants like the black nightshade, native poroporo (*Solanum aviculare*), and tobacco. In parts of Australia and the southern United States where it is a common tobacco-pest it is designated as the tobacco-leaf miner. Allan Wight reported the larvæ as feeding plentifully on the leaves of the native bulrush (*Typha angustifolia*), and from this considered that the moth was a native, but this is not supported by the weight of evidence.

The potato-moth, under the name of *Lita solanella*, is included in the Thirteenth Schedule of the Orchard and Garden Diseases Act, 1908, and foreign affected potatoes are liable to be stopped from landing, and are either reshipped outside the Dominion or destroyed on arrival at one of the inspection ports.

LIFE-HISTORY.

The life-cycle of the insect commences with the depositing of a small glistening egg by the brownish moth on the lower portions of the haulms, the backs of the leaves, or the exposed portion of those tubers that are nearest the surface and which may not be entirely covered with earth. Exposed tubers generally have the eye end uncovered, and the eggs are generally deposited in or near the eyes.

Each female moth may lay a number of eggs varying from one to two hundred, and the process may be extended over several days. In due course the eggs hatch, and the young larvæ bore their way into the tissues. In the case of leaf-infection the larvæ eat out the tissue between the two surfaces much after the style of the cineraria-leaf miner (*Phytomyza nigricornis*). In haulm-infection the larvæ bore down the stem, and, it is said in this way enter the tubers. So far as the present South Island outbreak is concerned, the majority of tuber-infection that has occurred during the growth of the plants has taken place by eggs deposited directly on the tubers. This is evidenced by the fact of the eye end being invariably attacked. This would not occur if the larvæ had entered them by way of the stems unless they bored out and entered the soil first, but whether this is a characteristic of the larvæ has not been definitely ascertained.



POTATO-MOTH, OR GRUB (*Gelechia operculella*).

Fig. 2. Grub, about average size. Fig. 3. Head and first three segments, upper side, enlarged. Fig. 4. Ditto, under side. Fig. 5. Moth, natural size. Fig. 6. Ditto, magnified : this cut shows the body rather too pointed, and without the hairs on the last segment. Fig. 7. Fore leg of moth, magnified. Fig. 8. Hind ditto.

When once the larvæ have entered the tubers they tunnel galleries in all directions, and when a potato is cut across the whole interior may be found to be riddled. The full-grown larvæ are about $\frac{1}{2}$ in. in length, of a dirty-white colour often tinged with a pinkish or greenish hue ; the head is dark and in full-grown specimens quite black. They may remain in the tubers for about eight weeks, when they work their way out and seek a suitable place to pupate. They often pupate on depressions on the tubers, or on the sides of the sacks, in crevices in the store-house, or attach themselves to the straw coverings of the pits. Before undergoing pupation a rudimentary cocoon of dirty-coloured silk is spun, which acts as a shelter to the dormant insect. During the summer, about fourteen days after pupation, the moths emerge. They resemble the clothes-moth, to which they are closely related. The wing-expanse varies from $\frac{5}{8}$ in. to $\frac{7}{8}$ in. The fore-

wings are light brown mottled with dark brown or black; the hindwings are narrow, blue-grey in colour, with a deep wide fawn-coloured fringe.

There appear to be several broods throughout the year, but in all probability the last brood develop pupæ that remain dormant for several months, especially where the winter is at all severe. The broods overlap one another, and this renders control methods more difficult than if they were well defined.

CONTROL METHODS.

Many methods have been suggested for the control of the potato-moth, but little concerted action is ever taken by farmers in any country for the suppression of this pest. The apathy of the farmer towards controlling the crop-enemies that yearly exact so large a toll of his products is almost incredible. The efficiency of Bordeaux mixture in controlling Irish potato-blight, and the almost complete disregard of this treatment by the average farmer, is a case in point.

It is, perhaps, too much to hope that the suggestions that are here given will be carried out, but the thorough adoption of them would do much to reduce the effects of the potato-moth to a minimum. The methods to adopt naturally fall under the two headings—the protection of the growing crop, and the protection of the tubers after digging.

THE PROTECTION OF THE GROWING CROP.

Selection of Land.—Fields that have carried a diseased crop should not be planted with potatoes for some seasons. Mangels, turnips, grass, or corn crops can, however, be grown on affected land without any danger. A proper crop-rotation should always be adopted where insects or fungi are at all troublesome.

Liming the Soil.—It is said that liming the soil before planting with air-slaked lime applied at the rate of about one ton per acre helps to ward off an attack, but the reason for this is not very obvious. In Europe liming of the soil is regularly practised in regions where the closely allied insect, the sugar-beet moth (*Gelechia ocellatella*) is troublesome.*

Planting.—Great care should be exercised in the use of clean seed. Diseased sets are not only liable to carry infection, but also in many cases by having the eyes eaten out will not develop. Tubers with tunnels in them also allow the free entry of putrefying bacteria and fungi, and often rot rapidly when planted, especially if wet weather is experienced. The sets should be planted rather deeper than usual, provided the land is well drained and not too heavy. Early crops appear to escape attack better than the late ones, so that it would seem a good practice to get in the main crop as early as possible and not unnecessarily delay planting.

* Jablonowsky der Tierische Feinde der Suckerrube.

Effect of the Potato-moth Caterpillar.

ivation.—One of the main field treatments is to keep the plants ›ulded up. This should be done very carefully, so as to avoid any becoming exposed during their growth. From this it follows that ›und should be in good tilth, and that the presence of large clods, ı which the moths could crawl, is a decided objection. For ease and ›y in high moulding the rows should be kept well apart, 30 in. being ıough to allow. The fields should also be kept as free from weeds ible.

aying the Tops.—French* and Kirk† have suggested the spraying tops with tar-water as a deterrent towards egg-laying, but I am un- whether this has ever been carried out on a large scale. The spraying tops several times during the season with Bordeaux mixture for the of Irish blight, a proceeding that should never be neglected by any grower, might also to a certain extent ward off ovipositing. A com- n spray of Bordeaux arsenate, as regularly used by fruitgrowers, ›rove much superior to ordinary Bordeaux.

PROTECTION OF THE TUBERS AFTER DIGGING.

ection before Storing.—A great deal of infection is liable to occur ı the period of digging and storing. Any tubers that are dug and the ground overnight are liable to have eggs deposited on them by th, which is chiefly a night flier. Bags standing in the fields with the vered with haulms may also have the potatoes badly infested before l to the store or pits. Potato-bags used in the field are also often holes, and easily allow the entry of the moth. For this reason the clean new bags is advocated, and they should be carefully sewn up ı as they are filled. If heaps of potatoes have to be left exposed ıould be thoroughly covered by a thick layer of earth well patted o that there will be no crevices through which the moths could reach ›ers. Cases have arisen where potatoes placed under the shelter ıt-fly have become badly affected after being dug.

ing over.—Before being stored or sent from the farm all tubers which any grubs, the presence of which can generally be recognized by the asses of frass at or near the eyes, should be treated. The best method r to soak in water for some days or boil. They can then be fed to ut as all the affected tubers have to be dealt with at once only a amount can thus be made use of.

ping the Tubers.—It has been suggested that all apparently sound ›s should as soon after digging as possible be thoroughly dipped in ıaterial that will kill any young larvæ that may develop from the eggs ıy have been deposited on them. The dipping in corrosive sublimate

›ench, C.: "Insect Pests," vol. ii, p. 156. † Kirk, T. W.: Leaflet for , No. 16, p. 3.

at the rate of 1 oz. to 8 gallons of water has generally been recommended. One ounce of the corrosive sublimate is dissolved in 1 gallon of water, and then 7 more gallons is added (metallic vessels should not be used). This should be allowed to stand for some hours, being occasionally agitated before the tubers are dipped. An immersion of about fifteen to twenty minutes will be found satisfactory. I believe that dipping in arsenate of lead at the rate of 1 lb. to 50 gallons will be found even better, but this has not been previously suggested. It has the advantage that iron vessels can be used in which to mix. The idea is to cover the potatoes with a thin film of poison, as is done for the control of the codlin-moth. Both these mixtures are poisonous, especially the sublimate, and if the potatoes are used for food they should be well washed in cold water before being peeled or fed to stock. Owing to the poisonous nature of these washes great care would have to be exercised in their use, but as corrosive sublimate has been recommended by certain writers it is as well to mention the procedure to adopt. The use of formalin has also been suggested, one pint to 35 gallons of water. This would tend to destroy any eggs that were on the tubers at the time of application, but would not form a protective coat, so that the process would have to be repeated from time to time.

Treatment of Field after Digging.—All the haulms in an infected field should be raked up and burnt after the tubers have been removed. The fires may, with advantage, be lighted at night, as they will then help to attract the moths that are flying about, and large numbers may in this way be destroyed. The turning-in of pigs or sheep into the fields should also be useful in getting rid of all the odd potatoes that may have been overlooked, and which otherwise would help to carry infection. After this the fields should be deeply ploughed so as to get rid of any weeds that might act as hosts.

Protection after Storing.—In storing the potatoes the stores should have all the crevices stopped so as to make them as moth-proof as possible. It is a good plan to tack buttercloth in front of any windows or ventilators that may be present, and tightly fitting doors are essential. In stores where there is bad ventilation the doors may be left open during a portion of the day, but should be always closed at night.

*Fumigation.**—It is, of course, more than likely that, no matter how carefully the potatoes have been sorted over, tubers with the grubs already in the tissues may find their way into the stores. The potatoes should from time to time be examined, and any affected or rotting ones be removed and burnt. If any moths or pupa-cases are noticed the whole store should be fumigated with carbon-bisulphide, using 20 fluid ounces for every 1,000

* Fumigation with carbon-bisulphide seems preferable to that of hydrocyanic-acid gas as it is handier, and there is less danger attending its use.

cubic feet involved. This material, being heavier than air, should be placed in shallow earthenware dishes on top of the potatoes; saucers placed here and there will be found convenient. Carbon-bisulphide is extremely inflammable, and no naked lights should be used during fumigation. This operation may have to be repeated several times at intervals of about a fortnight, on account of the overlapping of the broods and more or less continuous emergence of the insects. After the potatoes have been removed it is a good plan to give a final fumigation and to burn all refuse that may be lying about.

Pitting not advised.—The pitting of tubers likely to be affected is not recommended, as when once the pits are closed it is difficult to ascertain the amount of infection that has occurred. When the pits are opened all the affected potatoes should be burnt, and all refuse from the pit, especially the straw covering, which will harbour large numbers of the dormant insects, should be similarly dealt with. This is important, and should help to lessen infection next year.

The Use of Lamps.—The use of lamps with tarred or greased screens has often been advocated to trap the adult moths, but I have had no experience in them, nor do I think they will be necessary if the suggestions I have outlined are carried out.

CONCLUSION.

The methods of dealing with the tubers are rather troublesome to adopt, but some such system will have to be carried out if the moth is liable to continue to be as destructive as it has proved this year in the South Island. The keynotes in control lie in the use of clean seed, high moulding, destruction of all affected material, storing in mothproof stores, and carbon-bisulphide fumigation where necessary.

EDITOR OF PUBLICATIONS.

SINCE our last issue the death has taken place, after a long and trying illness, of Mr. George Bissett, the first editor of this *Journal*, a journalist having a wide knowledge of agricultural affairs, and a capable writer on many phases of rural activity. He was well known and respected among the farming community, more particularly in the South Island, where he spent the better part of a useful lifetime, formerly as a prominent figure in wool-trade circles, and latterly as agricultural editor of the *Canterbury Times*. Always a popular official, the late Editor of Publications has left very many friends to regret his demise. He leaves a son and three daughters.

The late Mr. Bissett is succeeded in the office of Editor of Publications by Mr. C Cuming, who has had a long acquaintance with agricultural journalism, latterly as editor of the " Rural World " page of the *New Zealand Times*.

NEW ZEALAND BUTTER.

THE QUALITY OF THIS SEASON'S MAKE.

D. Cuddie.

Complaints have been made in trade circles in regard to " fishiness " in New Zealand butter this season. They are being advertised abroad, especially in the Australian Press. Few specific complaints, however, have been made to this Division. On the contrary, I have received communications from the Home market to the effect that brands, the quality of which was unsatisfactory for several years past, have this season, by reason of the adoption of pasteurization, proved of greatly improved quality, and have, owing to a paler colour, due to the use of the combined churn, been most satisfactory to the trade in general. This has fully borne out the opinion formed at this end as to the season's quality in general.

Value of Pasteurization Principle.

I have periodically visited the grading-stores in order to note the effect of the general adoption of pasteurization, and to me it has been palpable that it has had the effect predicted when factories were first urged to take up this means of overcoming flavour-defects. The opinion of the graders agrees with my own. Individual members of the grading staff have reported that some of the best butter that has ever left this country has been exported this year. It may be well at this juncture to mention why this Division advocated pasteurization so strongly in recent seasons. When I was in London in the height of the butter season of 1907–8 I found, during the three months I spent in investigating the marketing of New Zealand dairy-produce, that " fishiness " was very prevalent in many brands of our butter. It was this experience that convinced me of the urgent necessity of pasteurization. It is significant that practically nothing was heard in New Zealand of this unsatisfactory defect at that time, though merchants at Home freely stated that " fishiness " was never more general. That season, however, the market was particularly buoyant –it was the season when our butter soared to 150s., whereas this season the market has been weak and disappointing. Then any quality changed hands without criticism. To-day, with an improved product, criticism is apparently common. It is one of the peculiarities of the London butter market, by the way, that " fishiness " develops with singular rapidity when the demand is weak. Of course, it has to be remembered that on a strong market the butter moves off rapidly, and any weakness has little time to develop to a bad stage,

whereas on a weak market the tendency is to hold stocks, and this frequently at an unfavourable temperature, with the natural result that any weakness has every opportunity of becoming more pronounced. There is little doubt that some of the butters found fault with have been for several weeks on the market, and consequently under ordinary circumstances would not be improved in quality. Unfortunately, the ultimate purchasers, from whom complaints are mostly received, are not aware of the age of the butter.

NECESSITY OF DATE-STAMPING.

This opens up the important question of the date-stamping of export butter-boxes, not only as a protection to the shipper and the purchaser, but to the grading system. Opponents of a compulsory system of State grading seize upon the complaints now being circulated against our butter as an effective argument against the system. A date-stamp, as part of the ordinary grade-mark, would prevent this. Of course, date-stamping would be opposed by a certain section of the trade, but while it would be inconvenient to them in arranging a sale it would be an obvious advantage to the final purchaser. From every point of view I am convinced that it would advance the reputation of our butter and be of great benefit to the industry.

SIGNIFICANT CRITICISM.

It is rather significant that while so much criticism of our butter is being indulged in nothing but praise is heard of our cheese, and this while the quality of our butter has, speaking generally, never been so satisfactory on leaving the Dominion, whereas the quality of our cheese has not displayed the same general advance in quality, though a number of brands have exhibited a distinct improvement.

A WEAKNESS IN BUTTER QUALITY.

While saying this much it is not denied that several brands of New Zealand butter have this season shown signs of what may be termed a "fishy" flavour prior to exportation, and reports on these brands which have reached the Dominion have confirmed the opinion of the graders at this end. On the other hand, I can hardly credit the truth of certain reports circulated as to the general "fishiness" in this season's New Zealand butter, for I am convinced that the more general adoption of pasteurization has had an excellent effect in checking undesirable flavours. It is not claimed, however, that pasteurization is effective under all circumstances, for there is pasteurization and pasteurization. In fact, more attention to detail is required in making butter on this principle; and it is only natural to expect that, with their new found knowledge of the process, some makers are failing to carry it out to the best advantage. Pasteurization is the key-note to clean and uniform flavour, but

unless a properly prepared and clean starter is consistently used the system may easily be more harmful than beneficial. With fuller experience of this method of manufacture, and the strict attention to detail which its success necessitates, the irregularities noticed this season will doubtless be overcome.

Excessive Moisture.

It has been stated in certain quarters that the wide disparity between the prices of Danish and New Zealand butters has been due in part to the prevalence of unsatisfactory flavours of the latter. This is probably quite a wrong view of the position. No doubt the main reason is the diversion of a considerable quantity of Danish butter to Continental markets, and a consequent shortage of supplies in British channels accustomed to the Danish article. The main reason for the weakness in popularity of New Zealand butter with a certain section of British traders is the tendency of quite a number of factories this season to employ a percentage of moisture which is too near the British legal limit. In England the actual vendor of butter is held responsible for its purity, and any breaches of the Act, such as water-adulteration, are viewed in a very serious light, heavy penalties being inflicted for even a first offence and imprisonment without the option of a fine for a third breach. This will suffice to indicate the nervousness of the Home grocer in handling butter which he has reason to believe contains moisture near the danger-line, and possibly over it. The risk is too great, and he prefers even a lower quality if it is a safer article. Obviously it is no advertisement for a grocer to be hauled before a Magistrate for selling an adulterated article. This statement of the careless use of moisture is not the outcome of any report from the Home end, but is the result of repeated tests made at this end, quite a number of factories, and factories well equipped, having been repeatedly warned this season of their risky method of manufacture. No butter should be taken from any combined churn without a rough test being made of its water content; and there is no excuse for failure to do this. Not only is the tendency of some factories to aim at too high a percentage of moisture—a bad thing from the viewpoint of a possible excess, and thereby the cause of ultimate legal action—but the body and texture of the butter is seriously affected. Some butters have also exhibited a weak salvy body, and altogether an unattractive appearance, due to overworking. Of course, these weaknesses, which, unfortunately, are more pronounced this season than in any past period, are confined to a minority of factories.

Some Factories doing Splendid Work.

It is gratifying to know, on the other hand, that a majority of factories are aiming at a high ideal and are safeguarding the reputation of New Zealand butter. Those factories which have adopted the pasteurizing system

of manufacture on sound principles are doing excellent work, and are receiving congratulatory reports from the Home end. Here is one which has just been forwarded to me :--

"We have always felt that if you decided to pasteurize, the butter would more closely resemble Danish, and so compete with that butter, and it has turned out to be the case. The quality of your butter is highly satisfactory in every way, indeed I have seen no New Zealand butter of such an even quality or so suitable for our market."

Another factory working on similar lines has just been informed by its London agent that the quality of its butter, had, in his opinion, reached perfection. These instances are only, however, examples of many similar reports that have come to hand. This goes to prove that the modern principles of butter-making which New Zealand butter-markers have now at command will enable them, given fair conditions of the raw material, to manufacture butter which will defy competition. It is therefore all the more regrettable that such poor work is being done at some factories, which, in their eagerness to secure quantity at the expense of quality, are not only damaging the reputation and present selling-value of their product, but in the process are damaging the interests of New Zealand butters in general; for there is little doubt that at the present time the weak character of the butters for which they are responsible is being used as a lever to drag down values in general. With their favoured conditions and knowledge of the business, which should insure the manufacture of a high-class product, New Zealand dairymen can surely afford to leave the production of a second-class butter to other countries.

DEPARTMENT'S AYRSHIRE HERD.

THE Moumahaki Experimental Farm has just received the ten pedigree Ayrshire cows, the remainder of the Sunnyside herd (Christchurch), the members of which were bred and selected by Dr. Levinge, late Superintendent of the Sunnyside Mental Hospital. These cows are of a fine utility standard, and were declared by the Scottish Agricultural Commissioner, Mr. James Dunlop, to be the best types of the utility Ayrshire he had seen in this country. They should be able to prove their productive capacity at the Taranaki station, where, probably, the Ayrshire stock of the Department—there is a good nucleus of a herd at Ruakura Experimental Farm—will be centralized, following on the specialization of dairy herds at the other farms. At Weraroa a fine Holstein herd is being established, and Jerseys are being made a feature of the Ruakura farm. The inducement for this policy is that the soil and environment at the several farms lend themselves to the best development of the breeds in question under suitable conditions. As well as these herds, the Shorthorn is being maintained both at Weraroa and at Ruakura. As the herds of the other breeds increase the Shorthorns will be reduced to smaller numbers, the objective to be aimed at all the time being the development of this popular breed, along with milk-producing lines.

LUCERNE.

SUCCESSFULLY ESTABLISHED AT MOUMAHAKI.

Primrose McConnell.

If it can be shown that lucerne can be successfully grown in this district it will prove an enormous boon to the farmers in general, and to dairy-farmers in particular. Once thoroughly established, lucerne requires comparatively little attention, and—what is of still greater importance—the soil, although continually yielding heavy crops, is not impoverished, but renewed and prepared for a further cropping rotation.

Although several small plots of lucerne which were established at Moumahaki Experimental Farm some years ago are still flourishing, attempts to grow the plant on a larger and more practical scale have up to the present failed. It has been repeatedly stated by farmers in the neighbourhood that it was of no use making an attempt to grow this valuable legume. I am convinced it can be grown, and that with success.

A Practical Test.

For the present experiment a field was chosen 7 acres 1 rood 17 poles in extent, the soil being typical of other parts of the farm—*i.e.*, a light sandy loam, dark in colour, on a yellow sandy clay subsoil. The quality can only be considered as second rate. The field in question stands in a rather exposed situation; the experiment will be all the more practical on that account, while in the event of making hay the situation will be an advantage instead of a draw-back.

In the spring of 1909 the land was sown with a mixture of tares, peas, oats, and barley. The crop was a fairly good one, was partly eaten off by bullocks, and the remainder ploughed under to a depth of from 6 in. to 7 in.

The following gives a history of the preparatory cultivation :—

Feb.	20–23.	Residue of green manure ploughed under.
,,	24 ..	20 cwt. per acre ground unburnt limestone applied.
,,	26 ..	Disc-harrowed.
Mar.	22–24.	Lightly ploughed so as to destroy weeds and not disturb green manure.
April	19–21.	Disc-ploughed to a depth of 7 in.
May	2 ..	10 cwt. per acre ground unburnt limestone applied.
,,	4 ..	Tine-harrowed.

June 5 .. 1½ cwt. kainit and 1½ cwt. basic slag per acre sown and harrowed in.

July 1–4. Disc-ploughed.

Aug. 4 .. Cultivated.

„ 25 .. Tine-harrowed.

Sept. 30 .. Cultivated.

Oct. 14 .. Soil from old lucerne plot sown at the rate of 1 cwt. per acre, and harrowed in.

„ 21 .. Tine-harrowed.

„ 22 .. Cambridge-rolled.

Nov. 14 .. Seed sown at the rate of 13 lb. per acre, mixed with basic superphosphate 3 qr. per acre, and broadcast with the corn-drill through the manure-coulters, the latter not touching the soil. The variety sown was Provence, as the Hunter River variety could not be obtained on account of the failure of the crop. The seed was covered in with the chain harrows.

Nov. 25 .. Finally rolled with the Cambridge roller.

I carefully tested the seed before sowing, the germination being 98 per cent. A sample was also forwarded to the Government Biologist, who declared the purity to be 99 per cent. No dodder-seeds could be detected. The cost of manuring per acre is as follows: 30 cwt. ground unburnt limestone, £1 1s.; 1½ cwt. kainit, 7s. 6d.; 1½ cwt. basic slag, 7s. 6d.; 3 qr. basic superphosphate, 4s. 1d.: total cost per acre, £2 0s. 1d.

The main objects in view when cultivating the soil so often were the destruction of weeds and grasses, and the thorough aeration of the soil. The cultivation may seem excessive, but it must be remembered that an extra ploughing or harrowing may just bridge the distance between failure and success.

On the 3rd of January, the lucerne having reached a height of 8 in., it was cut over and allowed to remain as a mulch. On the 20th February the second crop had reached a height

of 15 in., when it was again mown and secured as hay. The stubble was then harrowed twice over with heavy tine harrows.

At the date of writing (24th March) the aftergrowth looks green and healthy, although the surrounding pastures are burned brown with the drought. An examination of the roots shows that they have already penetrated the soil to a depth of 5 ft. After the first cutting one-half of the paddock was top-dressed with nitrate of soda (2 qr. per acre), and the other half with sulphate of potash (2 qr. per acre), an undressed check plot being left between the two. Up to the present the top-dressings have had no visible effect. This remark also applies to the ground limestone. A small strip running the full length of the paddock received no lime, but, as in the case of the sulphate of potash and nitrate of soda, there is no visible difference between the dressed and the undressed portions of the paddock. It is, of course, too early to come to any definite conclusion as to the merits of any of the dressings.

REMARKABLE CRITICISM.

A London dairy-produce firm, which is for some strange reason opposing the principle of pasteurization in buttermaking, wrote recently to a Taranaki dairy company to the following effect :—

"We think it advisable to tell you that we notice your butter turns off quickly in flavour after being exposed to the normal temperature, and we believe this is entirely owing to its having been pasteurized. The majority of the factories whose butter we handle do not pasteurize, and we find that their butter stands better after being defrosted. This is particularly the case with the —— butter and the ——. When your butter is first landed and full of frost it is as good as other factories, but after it has been exposed to normal temperature for a few days it does not compare favourably with others, which stand much better. We mention this to you because we have a very strong opinion, and have had for years, that pasteurizing is a great mistake, as it takes away the finest properties of the butter. Further, we think it must be an expense to you which might well be saved. . . . We may mention, further, that in the opinion of most of the judges here pasteurization is the one thing which has caused deterioration in the quality of Danish butter, which is not now of the high standard of quality that it used to be before pasteurization became general."

The remarkable nature of this criticism is contained in the fact that the company whose butter is complained of does not pasteurize. One thing this class of criticism emphasizes is that New Zealand buttermakers can hardly accept with confidence opinions on butter-quality from the Home trade, especially as this case is one of many similar instances where an entire misunderstanding of the practical side of buttermaking has been displayed.

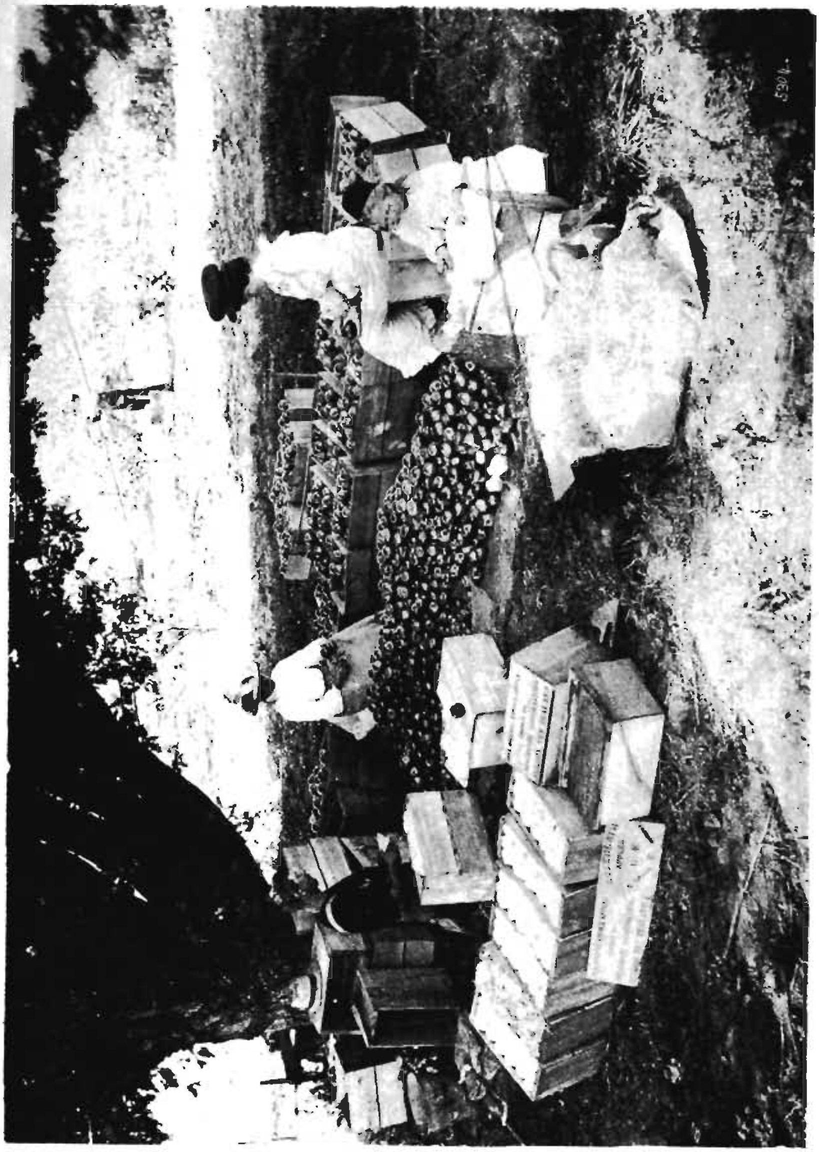
APPLE EXPORT TRADE.

SECOND NELSON SHIPMENT.

ON the 6th of last month the steamer "Rimutaka" loaded at Nelson the second experimental shipment of apples for the London market, the growers being encouraged in their enterprise by a Government subsidy of £325. Growers profited by the lessons of the first shipment, but unfortunately they were not able to take full advantage of the system they had come to recognize to be the correct one—reaching the market at its dearest stage—shipping as early as possible. They had the fruit picked at the right stage, and packed in an approved style, but it was found impossible to make the necessary shipping arrangement, so that the fruit which should have reached market at its highest point, and proved just what the Home trade required, had to be diverted to local markets, and when it was found possible to ship, the highest-class varieties had gone off. This year's shipment, however, is a decided step in advance of that of last year. It was shipped earlier, though not early enough to insure the best result; it was packed at a proper stage, and it was better graded and packed. While the fruit will not have to meet the disastrous position last year's shipment had to face, in being taken direct from the ship's cool-chamber to the retail market (owing to the fear of a slump by reason of the King's death), it will have to meet very heavy Australian supplies, which may not improbably bring about a low range of values. Altogether, the Nelson growers have yet to test the Home market under the most favourable conditions. It is hoped the shipping companies will be able to arrange for earlier sailings next year.

While the majority of the shippers followed the advice of the Department in regard to the correct picking stage, &c., some growers decided to carry out their own ideas, both as to varieties and stage of ripeness. Included in the varieties shipped which were not recommended were Epps's Seedling, Sharp's Late Red, Five Crowns, and Brownley Russet. The last two varieties were, in the majority of cases, shipped in an overripe condition. Of course, in these instances the fruit not being approved by the Department's Inspector did not receive the Government brand.

The total number of cases shipped was 5,500; of these, 4,000 cases were passed, and bear the Government brand. These 4,000 cases carry the State guarantee of 1d. per pound; the balance of 1,500 cases were forwarded at



Packing some of the Export Fruit in a Small Orchard.

the shippers' risk. The fruit, taken all round, was first class. The handling was excellent, and the space on the boat was much more suitable than that of last season.

Following are the varieties, and the number of cases of each, in the shipments which were approved for the guarantee: London Pippin, 1,306 cases; Jonathan, 1,246 cases; Sturmer, 816 cases; Munroe's Favourite, 688 cases; Afriston, 244 cases; Cleopatra, 240 cases; Brocket's Nonpareil, 214 cases; Sharpe's Late Red, 193 cases; Cox's Orange, 108 cases; Rome Beauty, 56 cases; Epps's Seedling, 50 cases; Brownley Russet, 46 cases; Aromatic Russet, 46 cases; Rymer, 40 cases; Reinette du Canada, 36 cases; Adam's Pearmain, 25 cases; Cambridge Pippin, 19 cases; Northern Spy, 11 cases; New Pigeon, 11 cases; Pride of Australia, 8 cases; Golden Reinette, 7 cases; Newton Pippin, 6 cases; Springdale, 4 cases.

A SOUTH AMERICAN SHIPMENT.

By the "Corinthic" on the 23rd of last month, Messrs. Buxton and Co., of Nelson, shipped 310 cases of apples, first-grade quality, and well packed, to Monte Video. Last year New Zealand sent 757 cases of apples and 20 cases of pears to the same port. Tasmania shipped to South America 9,297 cases of apples in 1910.

TWO FRUIT NOTES.

An officer of the Orchards Division reports: Whilst visiting Wade, I noted three Takapuna Russet apple-trees (which variety, I believe, had its origin in the Reinette du Canada). On each tree a fair crop of Takapuna Russets was growing, and a fair intermingling of Reinette du Canadas, both varieties appearing on the same branch. I understand that this apparent throwing-back of the variety to the parent stock occurs every year. Both varieties are well grown.

At another place a large block of Gravenstein apples was planted some years back. Owing to the bloom being profuse and the crop very small, an Orchard Instructor of the Orchards Division suggested some three years ago that grafts of Summer Golden Pearmain be worked on the trees. This was done (one small graft on each tree), with the result that as soon as the Summer Golden Pearmain started to bloom the crop of Gravensteins commenced to increase, until this year there is a tremendous crop, and the small branch of Summer Golden Pearmains is also simply loaded.

Recent heavy rains in Argentina have given a remarkable impetus to trade and agriculture, to land speculation, and to ploughing in general. —*Meat Trade Journal.*

:T CORRECTLY PACKED FOR EXPORT BY A TASMANIAN EXPERT PACKER UNDER ENGAGEMENT TO MESSRS. BUXTON AND CO., OF NELSON.

NEW ZEALAND WHEATS.

ANALYSES AND FLOUR VALUE.

G. DE S. BAYLIS.

To provide a thoroughly practical test of certain varieties of wheats grown in this Island on the co-operative experiment principle. Some of the grain was sent to Australia in order to obtain a report as to the respective milling qualities. With the exception of Marshall's White, the wheats had been introduced into this country by the Department of Agriculture. The investigation in question was undertaken by Mr. J. C. Brunnick, of the Department of Agriculture and Stock, Brisbane. Mr. Brunnick remarks that Power's Life and Federation appear to have the best-coloured flours, White Marvel giving the most chalky flour of the particular samples under investigation. The result of the investigation will be found on the opposite page.

THE WORLD'S CEREAL CROPS.

THE January Bulletin of the International Institute of Agriculture gives the total production and single numerical statement—that is, a comparison with the yield of the former year—of the winter and spring cereal crops in 1910 in countries situated north of the Equator, as follows: Wheat, 1,735 million hundredweights; single numerical statement, 100·3, or 0·3 per cent. greater than in 1909. Rye, 824 millions; statement, 96·1, or 3·9 less than in 1909. Barley, 586 millions; statement, 94·4, or 5·6 less than in 1909. Oats, 1,187 millions; statement, 95·4, or 4·6 less. Maize, 1,862 millions; statement, 114·8, or 14·8 greater.

The estimates of the probable total cereal crops south of the Equator, in Argentina, Chile, Australia, and New Zealand, would show 7·8 per cent. greater production, though 2 per cent. less area to be harvested than in the former year—namely, 144 million hundredweights against 133½. Argentine wheat is put at 73 millions, against 70 millions in the previous year. On the other hand, Argentine maize is estimated at not more than half the average yield of the last ten years.

The sowing of cereal crops north of the Equator was completed before the end of December everywhere except in Tunis, where it was delayed by drought. Conditions were normal, except for wheat, in the United States.

Variety and Grower.	Wheat Analysis.					Judging of Wheat by Points.								Remarks.
	Weight in Pounds per Bushel.	Milling Products. Per Cent. Flour.	Pollard.	Bran.	Strength of Flour Quarts per Sack.	Appearance of Grain.	Weight per Bushel.	Ease of Milling.	Percentage of Flour.	Colour.	Glutin.	Strength.	Total.	
						10	15	10	10	15	20	20	100	Maximum.
Comeback (R. Warriner, Greatford)	62·0	76·0	4·3	19·7	47·7	10	12	10	10	14	18	16	90	Bran small, very clean, very easy to mill. Sample very good.
Power's Life (J. P. Perrett, Sanson)	62·0	73·0	5·9	20·9	50·0	10	12	9	8	14	18	18	89	Sample very good. Bran small, very clean, easy to mill.
Jonathan (J. P. Perrett, Sanson)	62·5	71·0	5·6	23·4	49·3	8	13	9	7	13	17	17	84	Grain slightly pinched. Bran rather small, fairly clean, easy to mill.
White Shaw Tuscan (R. Warriner, Greatford)	61·6	72·5	5·3	22·2	40·2	7	12	10	8	14	17	12	80	Slightly shrivelled and pinched; contains many immature grains. Bran very large, fairly clean, very easy to mill.
Yandilla King (O. McElroy, Halcombe)	59·8	75·1	6·7	18·2	42·5	8	10	10	10	14	15	12	79	Many shrivelled and pinched grains. Bran fair size, very clean, very easy to mill.
Marshall's White (G. Stantiall, Greatford)	61·0	72·5	7·9	19·6	40·3	9	11	9	8	14	17	11	79	Good sample, grains plump. Bran fair size, fairly clean, easy to mill.
John Brown (G. Stantiall, Greatford)	58·9	72·0	9·6	18·4	43·3	6	10	10	7	14	16	12	75	Grains large, irregular, many pinched and shrivelled; poor sample. Bran large and clean, very easy to mill.
White Marvel (G. Stantiall, Greatford)	59·8	71·6	8·2	20·2	40·5	8	10	10	7	13	16	11	75	Fair sample, many immature grains. Bran large, very clean, very easy to mill.
Federation (D. Fraser, Bull's)	57·2	71·0	5·8	23·2	42·7	9	9	10	7	13	15	12	75	Good sample; grains regular and plump. Bran very large and fairly clean, very easy to mill.

FARM SEEDS.

IMPORTANCE OF PURITY.

T. W. LONSDALE.

THE season is at hand when the farmer is considering the question of grass-seeding. To the agriculturist, pure seed of good vitality is of the utmost importance, yet it is remarkable that very little attention is paid to quality, quantity being too often considered of greater importance.

SELECTION OF SEEDS.

After incurring considerable expense in preparing land for the reception of the seed, the farmer should select the seed most suitable for his purpose—seed of the most profitable variety, and of a character that will give him the best results. He should be careful to see that it is pure, especially that no seeds of noxious weeds are present. In the breeding of animals a rule generally recognized as being sound in general application is that "like begets like," the more striking characters being reproduced in the offspring, often in an intensified form; but it is not so widely known that a similar law holds good in the production of plants. Selection of seed is therefore just as essential to the successful growth of a crop as good cultivation and judicious manuring. When grass-seed samples are light we naturally assume that they are largely composed of chaff, in which case the number of germinating seeds will be relatively small. It is false economy to sow seed of this description, for the probability of securing a good crop is remote, while in many instances the expense of resowing has to be incurred. Therefore, the farmer who obtains pure well-grown seed, and discards the inferior, paves his way to success. It should not be forgotten that with increased age the germinating-power of seeds declines. The germinating-power also varies much according to species. This is further largely dependent upon the conditions under which the crop has been harvested, and to even a greater extent upon the treatment it has received after storing. Instances are known where seed has been harvested under ideal conditions, but, owing to neglect after storing, the vitality of the seed was completely destroyed. Yet to all appearances the seed was good. Thus to a limited degree the vitality of seed rests with the farmer, which makes it all the more essential to test germinating-power prior to sowing. It is well to dwell on this question of vitality, as there is a far too common practice of mixing old

seed with the produce of the last season's crop. We do not for a moment assume that seedsmen of good repute resort to this: the farmer is often the culprit, as old seed on hand is mixed with the new without first ascertaining its vitality.

Purity of Seed.

It is admitted that during the last ten years the purity of farm seeds has greatly improved. The wilful addition of impurities is becoming obsolete, as seedsmen value their reputation, and with keener competition firms concerned are forced to produce a high-grade article. The manner in which the seed question has been handled by farmers' co-operative companies and other rural societies, even by private firms, has no doubt brought about improvement and a healthier sentiment in regard to purity. So far as grass-seeds are concerned, locally harvested and cleaned grass-seed probably reach the highest pitch to which seed-cleaning has been reached in any country in the world. Our machine-dressed cocksfoot, ryegrasses, and Chewing's fescue are now recognized as of a higher degree of purity than is general in other countries. This feature is particularly creditable to New-Zealanders, as the seed-cleaning machines here in use, and which are responsible for the good results achieved, are the work of local inventors and local manufacturers.

In purchasing seed the farmer should demand the best locally-dressed article—that is, whenever practicable. He cannot yet simply place an order with a dealer and be assured of obtaining seeds of this description. So far as germination is concerned this can be done by the farmer himself, though he may call upon the assistance of the Biologist of the Department, who will be pleased to furnish any information in this connection. As a general rule imported seed will not all give the same results as seed locally produced. The distinguishing characteristics of nationality are not easy to discern, hence it is quite likely, unless dealing with reliable seedsmen, the purchaser may be supplied with seed from other lands.

Mixture of Seeds.

It would be futile attempting to name any special mixture of seeds as being the best. Composition of soils vary so greatly throughout the Dominion that even in districts not widely separated the mixtures most suitable to the different localities vary considerably.

Cocksfoot (*Dactylis glomerata*) is too well known to need comment. It is one of the best grasses we possess—nutritious, yielding a heavy crop, and after being cut for hay produces a good aftergrowth. It should be cut early, or the hay will largely consist of nothing more than woody fibre.

Italian ryegrass (*Lolium italicum*) is biennial, and for grassing land to remain down one or two years should form a fair proportion of mixture; in fact is a useful grass to sow in any mixture. It is especially adapted for

autumn or spring feeding, and when liberally manured yields a luxuriant crop on most soils.

Perennial ryegrass (*Lolium perenne*) does not yield so well as Italian, but is valuable in pastures. Although described as perennial it is by no means permanent, except on fertile and suitable soils. It responds freely to liberal manuring.

Timothy (*Phleum pratense*) is most suitable for heavy land, and should certainly find a place in permanent pastures. It must be remembered that this grass thrives in moist situations, but the land must be well drained.

Meadow foxtail (*Alopecuris pratensis*) grows well on heavy soils. It does not quickly reach maturity, but when established is one of the earliest of grasses. It should have a place in mixtures for permanent pastures. It is not popular at the present time, probably on account of the high price of seed, but when it becomes better known it will doubtless receive greatly increased attention.

Meadow fescue (*Festuca pratensis*) is a permanent pasture-grass of fine quality, and reaches its maximum growth in the second year. As with timothy, a moist but drained soil is preferred, but draining must be remembered.

Sheep's fescue (*Festuca ovina*) produces a useful pasture for sheep, but its habit of growth is hardly vigorous enough to provide a profitable crop for hay.

Numerous other varieties might be mentioned, but space does not permit of dealing with all of them, a few of the best being here given. Clovers are well known, and for permanent pastures the best variety is certainly the white clover, the others disappearing in a few years.

ROUGH-LEAVED RAPE.

REFERRING to the trials of rape reported upon at pages 356–57 of this Journal, 15th October, 1910, the variety therein described as "Sutton's Rough Rape" was so described in error. It was highly recommended, but is not one of Sutton's varieties, the trial packet of seed having been specially procured by that firm, to whose agents (Tothill, Limited) the following particulars were written :—

"There are two sorts [of Rough-leaved rape], the Winter and Summer; but we gather from your letter that it is the former which is required. Both have foliage like turnips—smaller than ordinary rape. The Summer variety runs to seed almost as soon as sown. The Winter variety stands later, but makes really no growth during cold weather. From trials made at our experimental farm we found that both are absolutely worthless for this country. Consequently we cannot recommend you to introduce them into New Zealand, and therefore added to our quotation a word denoting 'cannot recommend.'"

To Messrs. Sutton and Sons this explanation is due, as well as expression of regret that the variety was misdescribed.

PASTEURIZATION OF SKIM-MILK.

D. CUDDIE.

THE question of pasteurizing skim-milk at dairy factories is one which is exercising the minds of a great many of the dairy companies throughout the Dominion, and it would seem that special plants will be installed for carrying on this work at the majority of the factories in the near future.

With a view to encouraging the extension of this principle, by obtaining and disseminating information regarding the working and cost of the process, and the effect of the treated skim-milk upon the stock to which it was fed. negotiations were entered into at the beginning of last season by the Dairy-produce Division with the Glen Oroua Dairy Company, whereby permission was obtained from the company to install a plant on a somewhat large scale, capable of dealing with from 1,200 to 1,400 gallons of skim-milk per hour. One of the largest-sized pasteurizers was purchased, and fitted up early in the season, when the work was commenced. The machine was connected with the exhaust-pipe from the engine as well as with a direct steam-pipe from the boiler. At the commencement it was found that more or less trouble was experienced in connection with the milk foaming after it was heated. The capacity of the skim-milk tank was not sufficient, and the company gave an order for one of a larger size. Various appliances for dealing with the froth were experimented with, and this trouble was eventually overcome.

Unfortunately, the boiler-power at the factory was barely sufficient for the extra steam required to heat the milk, and after a more or less successful run it was decided to discontinue the work until the beginning of this season. The directors of the company expressed themselves as satisfied with what had been accomplished, and intimated that it was their intention to install a boiler of larger capacity during the slack season. Having carried out this arrangement, they again agreed that the work should be continued, and a start was made about the middle of September last. By special arrangement, an officer of the Department was placed in charge of the work, to attend to the pasteurizing of the skim-milk, and to exercise some supervision over the pigs belonging to the milk-suppliers to the factory, with a view to noting what effect the pasteurized milk had on the animals.

The pasteurization has been carried on for nearly seven months; the quantity of milk handled daily has reached 3,500 gallons; and after separation the skim-milk is heated to 176° at the rate of 1,250 gallons per hour. As an economical factor in the working of the process, it may be mentioned that the exhaust steam from the engine, which is also used for

heating the water for use in the factory, is sufficient to raise the temperature of the milk to 140°. This being the case, it is necessary to use only sufficient live steam to heat the milk from that temperature to 176°, the amount of extra fuel needed being thus reduced to a minimum.

The machine has been run very successfully, and practically without a hitch, during that time. The dairy company have expressed their satisfaction with the plant, as also have the milk-suppliers. An accurate account of the quantity treated daily has been kept, together with a statement showing the temperature to which the milk has been heated. No trouble has been experienced in connection with the milk foaming, as an appliance is fitted to the outlet end of the skim-milk pipe ; and this has the effect of breaking down the froth before the milk is delivered to the skim-milk measure. Although some objection has been raised to the handling of such a large quantity of hot milk when the question of pasteurization has been under discussion, the experience at Glen Oroua has shown that there is no cause for complaint, the suppliers on the whole being apparently quite contented with the condition of the milk as it is being delivered to them. It is also believed that the stock to which the milk is being fed are doing exceedingly well this year.

The plant is easy to keep in order, and the time spent in cleaning it after use is not great. Altogether it can be said that the pasteurization of the skim-milk at this factory has proved a thorough success, and it is intended to continue it under the control of the Division until the end of the season. It is then likely that the company will undertake the work on their own account, and possibly install plants at their several branches.

Dairy-factory directors, and those interested in the pasteurization of skim-milk on a large scale, would do well to pay a visit of inspection to the Glen Oroua factory, and see the process for themselves. They could also then hear what the suppliers have to say with regard to it. It is understood from the company that any one going there on such an errand would be welcome to make an inspection of the plant.

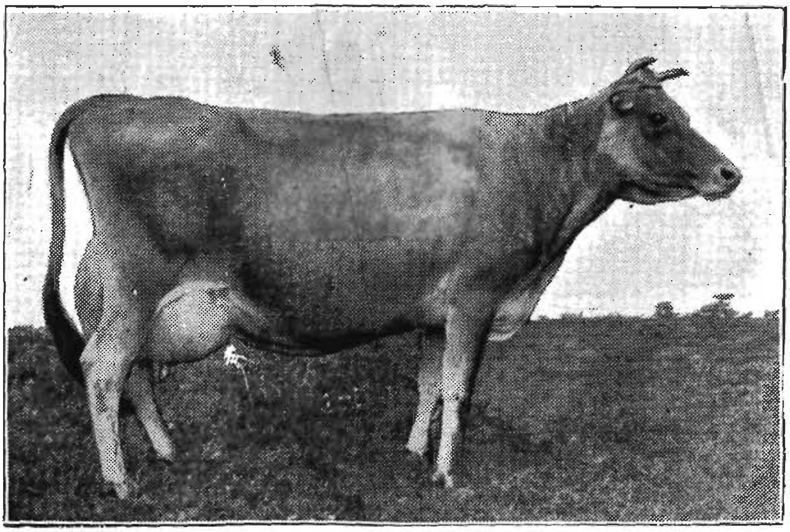
The above experiment refers to the carrying-out of the principle of pasteurization when a large pasteurizer of the ordinary type is employed. Since the test was initiated, however, pasteurizers for this special purpose of an entirely different type have been introduced. One of these, invented by Mr. C. Cooper, Manager of the Mangatoki Dairy Company, has been installed at several factories. This machine is constructed on a regenerative principle, that is to say, the incoming milk from the separators is raised in temperature by the heated milk flowing to the outlet of the machine, while the outflowing milk is reduced in temperature by its action in raising the temperature of the incoming fluid. In the first place, this apparatus overcomes the objection of many suppliers to having to handle milk at a high temperature, especially when the quantity is large, and also the objection

to the milk being too hot for immediate feeding on its return to the farm. Another salient point of this apparatus is its economy in working. It is claimed the amount of steam used is very much less as compared with the ordinary pasteurizer, and that it makes a lesser demand on boiler-capacity, a consideration where creamery plants are being worked nearly up to their maximum capacity. While it presents these advantages, it is declared to be effectively heating the milk, and thereby having the effect designed—destruction of the tubercle bacilli. It should be pointed out that it is imperative in the pasteurizing process that the milk should reach a temperature of not less than 176°.

A number of cheese-factories have also installed this form of heater for dealing with their whey.

A PROGRESSIVE COMPANY.

The Whangarei Co-operative Dairy Company is wisely using its influence in encouraging its suppliers to adopt improved methods. Recently the Director of the Dairy-produce Division of the Department delivered an address in its district on the need of producing milk on advanced principles, and the company has had a full report of the address printed and circulated among its shareholders.



Molina.

One of the most noted cows on the Island of Jersey, and dam of the young bull, Molina's General, imported by Messrs. Healey, Bayly, and Hancock, of Stratford.

NEW ZEALAND WOOL.

THE EXHIBIT FOR THE FIRST TEXTILE EXPOSITION.

THE wool-growing industry of this country is to be adequately represented at the first exhibition to be held in connection with wool and its allied industries, the Exposition of the North of France, to be inaugurated at Roubaix, the Bradford of Europe, next month. The Live-stock and Meat Division of the Department has carried out all the arrangements in connection with its preparation, the technical portion of the work being intrusted to Mr. E. L. Lees, the well-known wool expert, who has done his work remarkably well, the exhibit prepared being probably the finest collection of New Zealand wools yet collected, the big range of qualities being well graded and most attractively displayed.

The main object of the exhibit is to educate the manufacturers of Europe, particularly those of France, as to the true merits of New Zealand wool; to demonstrate that it is absolutely distinct from the Australian staple, and in several respects superior. In Europe, by the way, there is a considerable difference of opinion in regard to New Zealand wool. It is commonly understood that it may be classed with Australian, and it is, in fact, generally called "Australasian wool." To the foreigner there is practically no distinction between the two terms. Even in the London sales the distinctive character of the wools of this country is never emphasized as it should be. The New Zealand wools are catalogued with the Australian under the general title of "Australasian Wool." The New Zealand exhibit at Roubaix will be shown in a building by itself, and will appeal to those who examine it as wool in a class by itself. In connection with the display, a pamphlet, printed in English, French, and German, will be distributed. This will give the extent of the wool-growing industry of New Zealand, the great suitability of the climate and environment for the production of a healthy, high-class staple, and the great range in qualities and fineness of New Zealand wool to suit all classes of manufactures. The pamphlet also gives a description of the method of wool-selling in vogue in this country, and the facilities provided for shipment of wool to oversea buyers. Tables are included showing the quantity of wool produced, the quantity exported and its destination; also the proportion of greasy, washed, slipe, and scoured wools, and the increase in the local sales as compared with the increase in production. A

map in the booklet shows the big distance New Zealand is situated from Australia, this in order to emphasize the vast difference between the two countries in wool-growing conditions.

The exhibit will include over ninety representative fleeces, and these will embrace practically every grade of wool grown in the Dominion. Unfortunately, owing to the lateness of the season when the wools were collected, it was impossible to secure suitable samples of some of the coarser wools of the North Island. Apart from this the exhibit is thoroughly representative. The wools include merino, quarter-bred, half-bred, merino-Lincoln, merino-Leicester, merino-Romney, Corriedale, Lincoln, Leicester, Border Leicester, Romney, Southdown, Romney-Leicester, Romney-Lincoln, and lamb's wool of five different qualities. There are also slipe and scoured wools. The fleece wool is representative of some of the best flocks in the country. Following are the breeders represented, and each of these presented the fleeces to the Government: Messrs. E. Short, Feilding (Romney); H. Hadfield, Paraparaumu (Romney); S. R. Lancaster, Palmerston North (Southdown); James Little, Dalmeny (Corriedale); George Gerrard, Mount Somers (merino); A. C. McRae, Blenheim (Romney-merino); P. Mungavin, Porirua (Romney); R. L. Levin, Greatford (crossbred lambs); R. D. Douglas McLean, Hawke's Bay (merino, merino-Lincoln, Leicester half-bred, and lambs); W. T. Telford, Southland (merino and half-bred).

The slipe and scoured wools are loaned to the Government for exhibition purposes. The former comes from the works of the Gear Meat Company (Wellington), the Wellington Meat Export Company, the Canterbury Frozen Meat Company, and the Christchurch Meat Company. The scoured wool is from Messrs. William Nichols and Sons, of Belfast.

Fleeces in the greasy-wool section were also presented to the Government by Messrs. E. L. Lees and J. J. Burke, of Wellington, and by Messrs. J. H. Kirk and Co. (Invercargill) and Messrs. Abraham and Williams (Wellington).

The New Zealand Loan and Mercantile Agency Company lent considerable aid to the project, and kindly provided good storage space free of charge while the wool was being prepared and packed.

The pen of White Rocks which won the Studholme Test in the Christchurch Egg-laying Competition, laying 1,206 eggs in the twelve months, and being declared the best table and standard-bred birds in the test, were from the Department's Burnham poultry station stock. They are the property of Mr. H. M. Bannehr, of Christchurch.

THE HEMP INDUSTRY.

IMPROVED WORK REQUIRED.

W. H. FERRIS.

THERE is little change to report in the position and prospects of phormium-fibre. In the middle of March there was a slight advance in the market price, but it was short-lived, and the prospects at the end of the month were no better than they were at the beginning. Current returns make it impossible for millers to continue operations except where they have well-equipped mills, are paying only a reasonable royalty, and have good leaf near at hand. There are millers, however, who, thus happily situated, are finding the business really payable by reason of the fact that they have taken full advantage of the several means now fortunately at their disposal for the production of a superior product. Owners of mills who, season after season, had failed to reach the higher grades have this season been able to produce even "fine" quality, and thereby convert failure into success. This has been mainly due to the employment of an improved stripper and the automatic washing-machine, and the running of these inventions to the best advantage.

One great difficulty millers have had to contend against this season is that diseased leaf has never been so prevalent, which has prevented in a number of instances the production of a profitable grade.

In many cases the quality of the hemp which reached the grading-stores during the month would have been pointed much higher but for the unsatisfactory work in scutching. This branch of milling is invariably done under the contract system, and the tendency is to aim at quantity rather than quality. One result of poor scutching, and the consequent bad tail of the hanks, is that cordage-manufacturers experience great trouble in spinning, owing to the presence of knots or "tow balls" in the improperly treated tail. Oversea buyers in general complain bitterly of this weakness, which is having a detrimental effect on the sale of phormium-fibre. This fault has to be recognized in grading, and many a parcel dealt with during the past month has had, in consequence, to be put in a lower grade than that which the quality of the body of the fibre merited.

Many millers do not attach the importance to colour they should. The best grades of rival fibres have a much better colour than is general with the bulk of New Zealand hemp, and this is being made the most of by foreign buyers, especially where the hemp is required for special purposes. In many cases the water in which the hemp is washed is the cause of the bad colour, but in too many instances the trouble is due to carelessness in the paddocking. In some cases, however, it has been impossible to secure the colour desired even where every care has been taken, owing to the absence of night dews and prevailing dry weather, which has been all against effective bleaching. The trouble is more pronounced where the hemp has been badly washed.

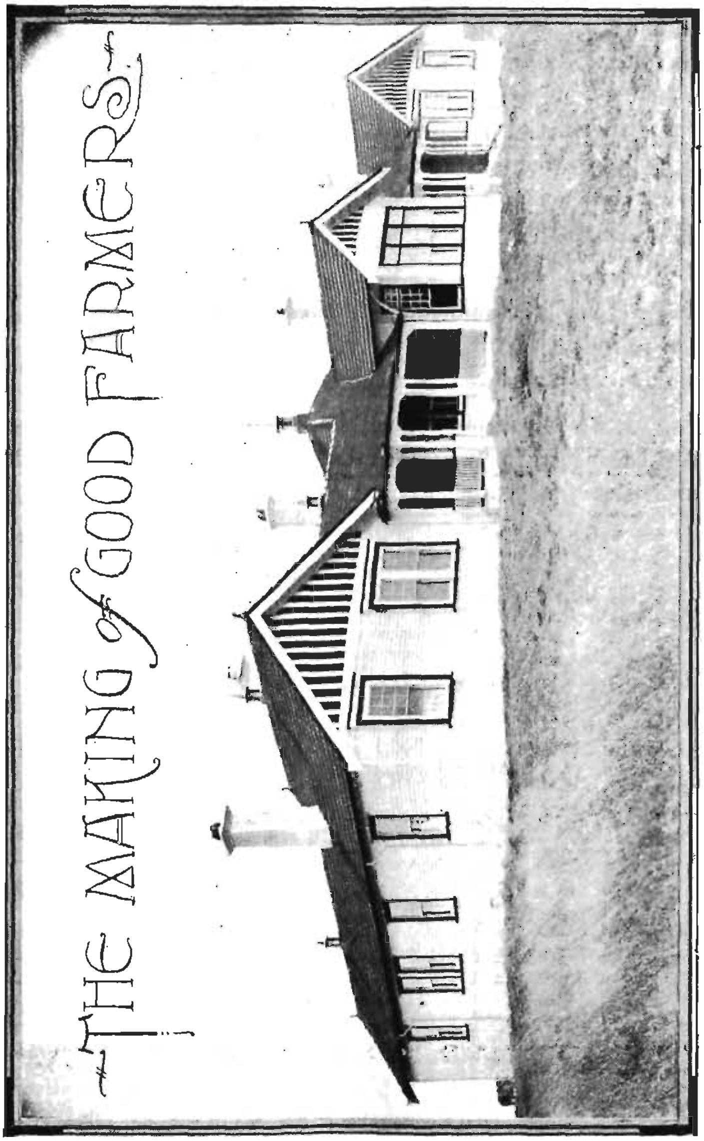
Generally, the stripping in the Wellington, Marlborough, and Canterbury districts has shown a distinct advance, owing not only to improved apparatus, but to the better work of the men in charge.

Tow is a greatly improving product, but unfortunately too much rubbish is still being left in, and the proportion of first grade is therefore low. Millers could easily effect an improvement by the exercise of more care in the shaking process.

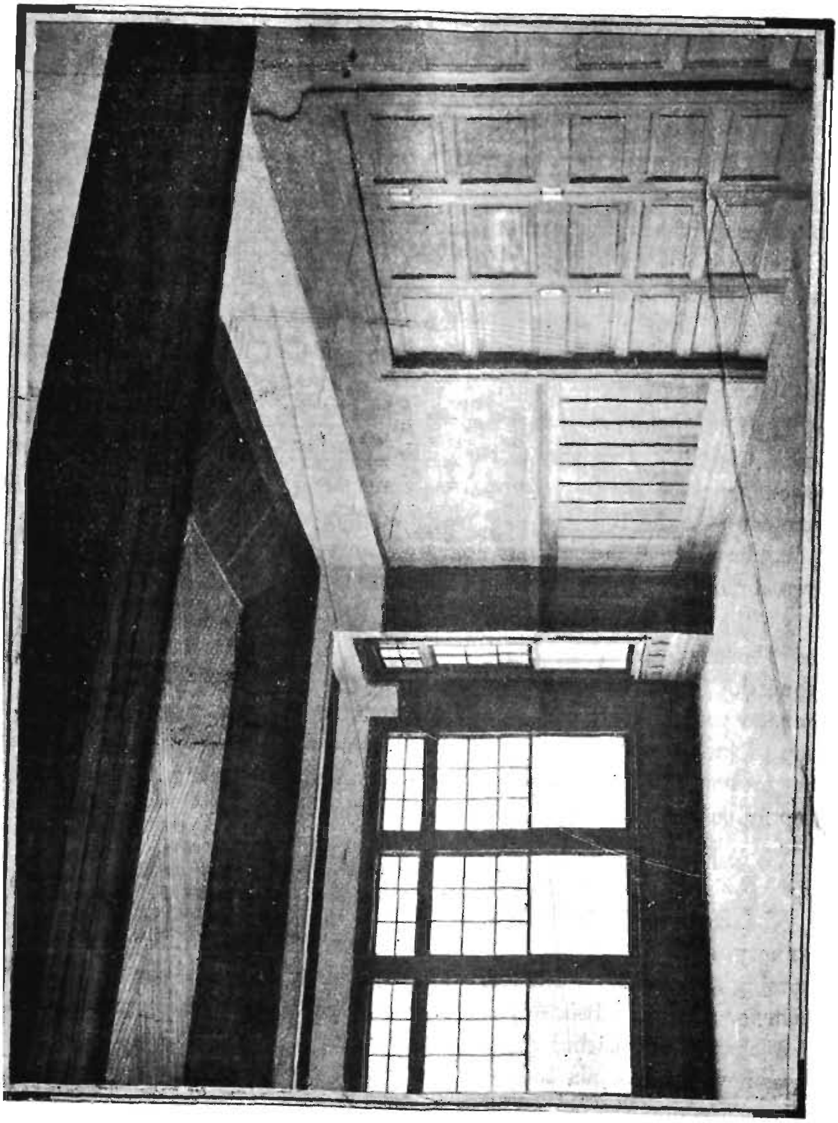
STOCK IN QUARANTINE.

The following stock was received into quarantine during the month of March :—

No.	Breed.	Sex.	Port of Origin.	Owner or Agent.	Address.
		SOMES ISLAND (WELLINGTON).			
5	Holstein ..	Cows			
6	Jersey ..	,,	Sydney ..	Department of Agriculture	Wellington.
1	..	Calf			
13	Holstein ..	Heifers			
1	,, ..	Calf	Sydney ..	C. Hopping ..	Glen Oroua.
1	,, ..	Cow			
1	,, ..	Bull			
3	,, ..	Heifers	Sydney ..	W. Bayliss ..	Mangatainoka.
2	,, ..	Calves			
2	Hereford ..	Bulls ..	Sydney ..	H. Campbell ..	Hastings.
		QUAIL ISLAND (LYTTELTON).			
2	Holstein ..	Bulls ..	London ..	Dalgety and Co. ..	Christchurch.



The New Homestead, Ruakura Experimental Farm.



COW FODDER.

A MOUMAHAKI EXPERIMENT.

PRIMROSE McCONNELL.

AN experiment has been carried out at the Moumahaki Experimental Farm at the request of the Eltham branch of the New Zealand Farmers' Union, the fodders experimented with being chosen by the union. The object was to discover the fodder most suitable for tiding the cows over the dry season without the labour and expense of cutting and leading off, as is necessary when maize is grown.

The three fodders selected were Bhuda kale, Thousand-headed kale, and rape. One-fifth of an acre of each was sown in No. 2 paddock, which this season has been entirely devoted to variety-crop experiments. The seeds were sown on the 18th October, on raised ridges 26 in. apart, at the rate of 2½ lb. per acre. The fertilizers used were sown at right angles to the fodder-rows, a month previous to sowing the seed.

All the fodders made a rapid growth, and by the 1st January the rape and Thousand-headed kale had reached a height of 4 ft., and was dense in proportion. The Bhuda kale, although not so tall, yet weighed out a heavy tonnage per acre. It can be easily understood that to turn cows on to a crop of such proportions would mean an enormous waste of fodder, seeing that probably as much would be trampled under foot as eaten. In a smaller crop, of course, the waste would not be so noticeable.

BAD EFFECT ON MILK-FLAVOUR.

The feeding of the fodder to the cows was commenced on the 17th January, and carried out for thirty-six days. The milk-yield was weighed morning and night. Each fodder was tested by the same cows and fed to them for a period of six days at a time only, so as to eliminate the effects of a change of weather as far as possible. During the whole thirty-six days, however, no rain fell. At the end of each six days, feeding with a different fodder was immediately proceeded with. The weight of the milk during any of the six days on any of the fodders is an average of the last three days only, as the first three days would be more or less influenced by the previous feeding.

The fodders were carted off and fed to the cows immediately after the morning's milking, each cow receiving about 70 lb. All three fodders gave

a very pronounced unpleasant flavour to both milk and butter, and the latter was of very inferior quality.

CLUB-ROOT.

The Bhuda kale was the first to show the effects of drought, while the Thousand-headed kale kept green to the last. The rape was the only one of the three affected with club-root. Where the crop was manured with basic slag and basic superphosphate there was only a trace of the disease, but where superphosphate was used quite 50 per cent. of the rape-plants were more or less affected. The above effects of manuring also apply to the turnip and swede varieties in the same paddock. In order to determine which crop would make the best aftergrowth, part of the plot was eaten off with sheep. In the initial stage of the aftergrowth, the Bhuda kale made the most rapid growth, but was soon overtaken and passed by both the Thousand-headed kale and rape. The sheep showed a decided preference for the Bhuda kale and rape, and ate both "to the bone" before they touched the Thousand-headed kale, in spite of the fact that both the former were showing the effects of the drought, which did not seem in any way to affect the latter.

The following table shows the results of the manuring, also the daily average per cow on each of the fodders :—

Plot.	Fertilizers per Acre.	Cost per Acre.	Bhuda Kale.		Thousand-headed Kale.		Rape.	
			Tons of Fodder per Acre.	Daily Average Milk-yield per Cow.	Tons of Fodder per Acre.	Daily Average Milk-yield per Cow.	Tons of Fodder per Acre.	Daily Average Milk-yield per Cow.
1	Basic superphosphate, 2½ cwt. ; kainit, 1½ cwt.	21s.	21·23	25·6 lb.	30	25·3 lb.	30	24 lb.
2	Ground unburnt limestone, 20 cwt. ; superphosphate, 2 cwt. ; kainit, 1 cwt.	30s.	20·8		25·6		25·3	
3	Basic slag, 3 cwt. ; kainit, 1½ cwt.	28s.	21		28·35		28	

THOUSAND-HEADED KALE THE BEST.

It will be seen from the above table that the Bhuda kale gave the highest average milk-yield ; on the other hand, it yielded a much less weight per acre. Taking all the good and bad points of the three fodders into consideration, the Thousand-headed kale undoubtedly stands at the top, as far as this experiment is concerned, as it has yielded the highest average of milk, and has proved itself a good drought and parasite resister. For my own part, I consider that none of the above fodders, when fed to cows, can

sideration the fact that the maize is a heavier drain on the soil, and must bear the extra cost of cutting and leading off.

VALUE OF MAIZE-FEEDING.

When the experiment with the above fodder was brought to a close the cows were immediately put on to the maize. The effect of the change was magical: in two days there was an increase in the daily average milk-yield per cow of 2½ lb., and the quality of the milk and quality and flavour of the butter became perfect. Thirteen cows were fed on two-fifths of an acre of maize for two months. Two acres giving a similar yield would carry a large herd through a lengthy dry period. The Early Red Hogan and Eclipse varieties are two of the best fodder maizes, and the cows readily eat every part, even the hardest of the stalk. The Red Hogan variety, in spite of the long drought, has reached a height of 11 ft.

JAPANESE MILLET.

One acre of Japanese millet has been grown here this season, and gave an average yield of 22 tons green fodder per acre. This fodder is rapidly coming to the front, and in many instances, in Australia in particular, it is taking the place of maize. It is credited with giving a greater milk-yield than maize, is hardier, not so easily injured by the wind, and, what is of great importance, yields a good aftergrowth. Some growers allow the millet to reach a height of about 3 ft., then turn the cows in. When this system is adopted the crop may be eaten off three times during the season. Millet, like maize, should be sown in rows 30 in. apart, to admit of after-cultivation.

TARES.

Tares is another exceedingly useful fodder, especially during the winter months, and, as a matter of fact, in this climate it can be grown all the year round. It also leaves the soil in fine condition for a following crop. A few oats should always be sown with the tares, as they prevent the latter from lodging badly. Among the Ayrshire dairy herds in Scotland this is the premier summer fodder, and it is the general custom for the horsemen on the farms to mow and lead a sufficient daily supply between the hours of 5 and 7 in the morning. I may state that I am speaking from personal experience of the work. The quality of butter and cheese resulting from the use of this fodder is excellent. About an acre of winter tares has been grown on this station this season for seed. The growth of the crop was phenomenal, the average length of the straw being about 7 ft.

LUCERNE EXCELS.

Lucerne, of course, excels all other fodders where it can be successfully established.

SOME POTATO EXPERIMENTS.

INSTRUCTIVE WORK AT A COUNTRY SCHOOL.

It is a pleasure to record the following interesting variety and manurial tests carried out at a rural school in Taranaki, the teacher of which, Mr. W. A. Curtis, is evidently imbued with the right spirit in regard to elementary agricultural knowledge. The report, it will be seen, is distinctly creditable, as it includes a history of the soil on which the experiment was conducted, as well as a good report on the result.

The account reads :—

The ground is a sandy loam, its aspect being to the north, while it is fairly sheltered. It was dug by school pupils, and trenched in 1909. The history of the plot is that in 1908 it was in grass, an old pasture ; in 1909 it carried a crop of turnips, manured as in 1910 ; in 1910 the crop of potatoes referred to in the experiment described herewith :—

A. Average Yield of Potatoes.

Sown, 2nd August, 1910 ; lifted, 1st February, 1911.

Variety.	Area of Plot.	Yield per Plot.	Yield per Acre.
	Sq. yds.	lb.	T. cwt. qr. lb.
Dalmeny Beauty	24	110	9 18 0 7
Million Maker	24	119	10 14 1 2
White Beauty of Hebron	12	69	6 4 0 27
Up-to-Date	12	11	1 19 2 4
Sutton's Abundance	12	19	3 8 1 13

B. Effects of Manures.

Same plot of potatoes.

Variety.	No Manure.	3 cwt. Superphosphates.	3 cwt. Blood.	2 cwt. Superphosphates and Blood.	3 cwt. Bonedust.	3 cwt. Rock Phosphates.
	T. cwt.	T. cwt.	T. cwt.	T. cwt.	T. cwt.	T. cwt.
Dalmeny Beauty ..	4 6	6 9	12 8	12 19	12 8	9 14
Million Maker	9 14	12 19	12 8	14 0	7 11	7 11
White Beauty of Hebron ..	7 13	5 8	5 18	4 18	7 0½	5 18
Up-to-Date	2 2	1 1	2 2	2 2	2 2	2 2
Sutton's Abundance ..	3 3	4 6	3 3	4 6	2 2	3 3

Notes.—1. Dalmeny Beauty and Million Maker gave best yields ; hardly any blight up to 30 and 40 good-sized potatoes at root.

2. White Beauty of Hebron gave largest tubers—few at root ; blighted.

3. Up-to-Date and Sutton's Abundance badly blighted ; a failure. It must be remembered the seed was not first class in these varieties.

4. The manure was broadcasted at time of sowing.

MIXING OF FERTILIZERS.

B. C. ASTON, P.I.C.

THE following diagram, known as Dr. Geeken's, has been published far and wide. Some points upon which it is not infallible may be stated. Superphosphate and Thomas's phosphate (basic slag) may be mixed advantageously just before sowing, and drilled in with the seed of root crops. This mixture has given splendid results in both North and South Islands. If, however, the mixture be made much prior to the sowing the ingredients will set to a hard unmanageable mass. The constituents must always, therefore, arrive at the farm in separate bags.

Superphosphate mixed with a certain amount of caustic lime has been used largely in Europe under the name of " basic superphosphate." About 15 per cent. of slaked lime will revert all the phosphate to the dicalcic or citrate soluble state.

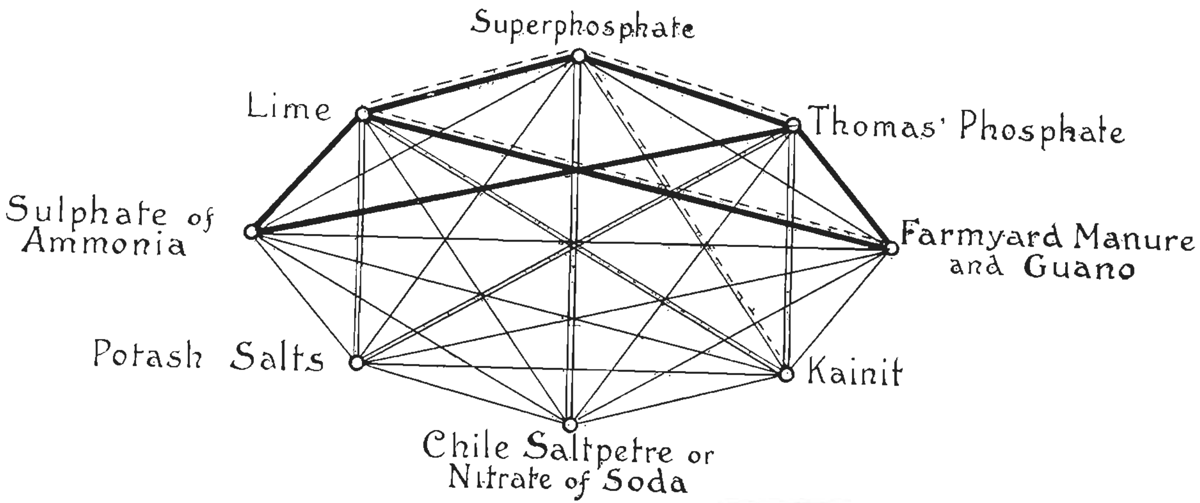
It is not admissible to mix superphosphate and kainit unless a certain amount of peat or humus is added, otherwise a sticky mass will result which will be impossible to drill or, in fact, do anything with.

Many guanos at present on the market contain absolutely no ammonia, and therefore may be safely mixed with lime if considered advisable. Whether they contain ammonia or not may be ascertained by the purchaser from a perusal of his invoice certificate, which he is entitled to demand from the vendor if the amount of the fertilizer exceeds 5 cwt.

Diagram will be found on opposite page.

INTERNATIONAL SHEEP-BREEDERS' ASSOCIATION.

THROUGH the Secretary for Agriculture, Mr. F. S. Pope, the International Sheep-breeders' Association of England has issued an invitation to representatives of any society in this country interested in sheep-breeding to be present at its annual meeting, to be held on 24th June, at Norwich, during the course of the Royal Show of 1911. The subject to be discussed will be the " Supplies of Mutton and Wool to Great Britain from Outside Sources." The secretary, Mr. Walter William Chapman, the Bell Hotel, Norwich, England, will be obliged if an early intimation of the name, home address, and address in England of representatives are furnished to him.



DR. GEEKEN'S DIAGRAM—MODIFIED.

Substances connected by the thick line should not be mixed; substances connected by double lines should be mixed only immediately before use; substances connected by single thin lines may be safely mixed together at any time.

The modification of the above diagram consists in the addition of the dotted lines, the substances connected by which may be mixed subject to the precautions mentioned on the preceding and this page.

CO-OPERATIVE EXPERIMENTS.

TWO INTERESTING TRIALS.

G. DE S. BAYLIS.

FOLLOWING are the results of two of this season's North Island co-operative top-dressing experiments, conducted by the Department in co-operation with individual farmers :—

No. 1 experiment was carried out under the auspices of the Pahiatua and Akitio Agricultural and Pastoral Association by Mr. W. Wakeham, of Pahiatua. The land was comprised of a medium stiff soil, and the pasture had almost entirely run out. The effect of the manure was astonishing, clearly demonstrating the great value of top-dressing under the prevailing conditions. The returns are for two seasons.

Plot.	Manures per Acre.	Yield 1909–10 Season: Pounds of Hay per Acre.	Yield 1910–11 Season: Pounds of Hay per Acre.	Increase over "No Manure," 1910–11 Season.	Value of Increase, 1910–11 Season.			Cost of Manure per Acre.			Total Increase for Two Seasons.	Net Gain for Two Seasons per Acre.		
					£	s.	d.	£	s.	d.		£	s.	d.
1	No manure ..	1,104	1,880	..		..			..		..		..	
2	2 cwt. super. ..	1,624	3,160	1,280	1	8	6	0	10	6	1,800	1	9	8
3	2 cwt. super., 8 cwt. ground burnt lime	1,960	4,376	2,496	2	15	8	0	18	0	3,352	2	16	9
4	2 cwt. super., 8 cwt. ground burnt lime, ½ cwt. potash sulphate	2,360	5,640	3,760	4	3	11	1	5	6	5,016	4	6	6
5	No manure ..	1,096	1,816	..		..			..		..		..	

NOTE.—The grass was made into hay and weighed just before stacking. The hay is valued at 50s.—as in previous seasons. The manures were applied rather late in the spring 1909. The quality of the hay on the manured plots was infinitely superior to that on the unmanured land, being full of white clover and trefoil.

No. 2 experiment was carried out on two paddocks of 5 acres each. The manured plot was top-dressed two seasons ago with 4¾ cwt. of basic slag. The returns given are therefore this season's. The soil is a stiff loam on a retentive clay. The experiment was conducted by Mr. G. L. Marshall,

of Greenbank, Marton. The results shown are indicative of the carrying-capacity :—

Dates on which Animals were on the Pasture.	Number of Days.	Number of Animals on the Plot.	
		Manured.	Not Manured.
Jan. 14 to Jan. 31	17	Nil	..
Jan. 31 to Feb. 11	11	75	40
Feb. 11 to Feb. 24	13	..	..
Feb. 24 to March 10	14	51	35
March 10 to March 25	15	..	..
March 25 to April 12	18	46	24
April 12 to April 30	18	..	..
April 30 to May 17	17	56	42
May 17 to May 26	9	..	..
May 26 to Aug. 30	96	18	10
Aug. 30 to Sept. 23	24	17	10
Sept. 23 to Oct. 20	27	..	..
Oct. 20 to Oct. 31	11	22	11
Oct. 31 to Nov. 16	16	36*	21*
Nov. 16 to Nov. 24	8	..	..
Nov 24 to Dec. 4	10	80†	46†
Dec. 4 to Dec. 14	10	..	..
Dec. 14 to Dec. 26	12	178‡	80‡
	346		

* Dry sheep. † Ewes with lambs. ‡ Ewes and lambs all counted.

Average number of animals carried per acre on the manured plot. 5·32.
Average number of animals carried per acre on the unmanured plot, 2·98.

AGRICULTURAL-SHOW DATES.

The Winter Fixtures.

Northern Winter Show, May 4 and 5, Rangiora.
Auckland Winter Show, May 22–27, Auckland.
Dunedin Winter Show, last week in June, Dunedin.
Waikato Winter Show, June 6–10, Hamilton.
Taranaki Winter Show, June 7–10, New Plymouth.
Southland Winter Show, June 7 and 8, Invercargill.
National Dairy Show, June 20–23, Palmerston North.
Dominion Dairy Show, July 5–8, Hawera.

Secretaries of rural show societies in general are requested to forward the dates of the shows of their organizations as soon as available, for noti-

TEETH OF THE HORSE.

SOME REMARKS ON EQUINE DENTISTRY.

H. A. REID, F.R.C.V.S., D.V.H.

THE large amount of attention devoted at the present day to the condition of the teeth of the horse prompts me to make a few remarks on a subject worthy of consideration from several points of view.

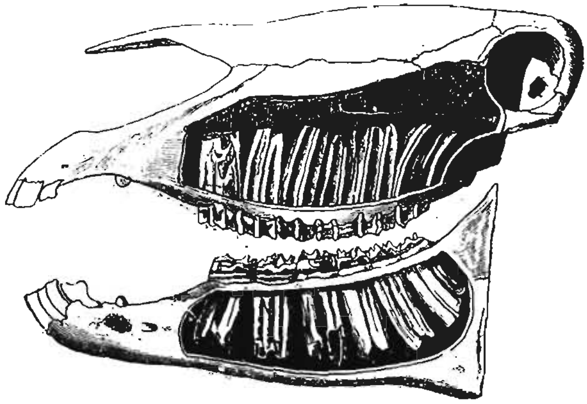
Having had the opportunity during the past few years to witness the effects of various forms of equine dentistry practised in New Zealand, I am in a position to state that, speaking generally, unwarrantable and useless interference is of exceedingly common occurrence. I therefore propose to endeavour to sound a much-needed warning-note to horse-owners and others who take an interest in horses on this, to my mind, important matter.

It is perhaps advisable when introducing a subject of this nature to give a brief description of the structure of the teeth and normal conformation of the mouth. In the first place, it must be understood that the teeth of equines are totally different in structure from those of man and many other mammalian animals. The best method of studying a question of this kind is to obtain a horse's molar or back tooth (grinder) and, if possible, also one of the front or incisor (biting) teeth. These may be extracted from an old skull, or, should this not be available, the teeth may be examined in position in the living animal. It will then be seen that, in place of the teeth being covered by, and apparently composed of, white, shining enamel, they are made up of a number of variously distributed substances, or, anatomically speaking, are compound, in contrast to the simple teeth of, for example, the human subject and dog. The substances entering into the composition of the horse's teeth are known respectively as enamel, dentine, and cement. These three elements are well defined, and can easily be distinguished upon examining a horse's incisor or front tooth.

There will be seen in the centre of the "table" or wearing-surface of the tooth, immediately surrounding the dark, oval cavity, or "mark," a narrow ring of enamel. Around this enamel is a band of yellowish-coloured dentine, outside which again is the outer layer of hard, polished enamel protected by a covering of the cement substance. This substance can be seen on the exterior surface of the tooth, but does not extend to the "table." Exactly the same arrangement exists in the grinding-teeth, but, owing to their more irregular conformation, it is not so readily observed.

The teeth of horses differ again from those of men or dogs in their mode of growth—that is to say, they do not remain stationary after full development, but continue to grow upwards or downwards in the lower or upper jaw, and to have their surface worn away by the process of mastication.

The horse possesses during its life two sets of teeth. The first temporary, milk, or " foal " teeth, and the permanent, or " horse " teeth. The temporary teeth are much smaller, whiter, and, in the case of incisors, more shell-like than the permanent ones, the latter appearing as larger, stronger structures, light brown in colour. All teeth are divided arbitrarily into four divisions—the " table " or wearing-surface, containing the " mark," or blackened depression already referred to; the " crown," or that part of the tooth above the gum: the " neck " (very well defined in milk-teeth), or point where tooth and gum meet; and the " fang," or root, which is within the jawbone. The teeth are hollow, the cavity running through them containing the sensory nerves and blood-vessels.



SHOWING UPPER AND LOWER MOLARS *in situ*.

It is not my intention to trace the development of the tooth from birth upwards, but perhaps it may be well to state, for the benefit of some readers, that when dentition is complete, the horse possesses six incisors or front teeth in both upper and lower jaws, and twenty-four molars, six on each side, in the jaw. The male has, in addition, four tusks, one on each side of the upper and lower jaws, and these may also occasionally be represented as rudimentary organs in the mare. It is not unusual to find in front of the first upper molars in the colt small rudimentary teeth, commonly known as wolves' teeth. In some instances these remain after the permanent teeth have taken the place of the temporary. These so-called wolves' teeth have been ignorantly accused of causing blindness, and for this reason are sometimes removed. This is quite an unnecessary proceeding. They may with perfect safety be allowed to remain, and, as a rule, will be shed

in time of their own accord. The inner border of the upper molar teeth rests on the outer edge of the lower, the tables sloping downwards and outwards. Thus the upper teeth tend to overhang the lower, and their outer aspect is lower than the inner. The molars of the lower jaw take up a corresponding position—that is to say, project upwards on their inner aspect. and come into contact with the upper teeth towards their outer edge. The teeth thus form an angle in the mouth, the lateral movement of the jaws during mastication causing the uneven surface of the table to act. as it were, like a grindstone, crushing the food and allowing the salivary secretions to come into contact with it in order to prepare the way for swallowing and subsequent digestion.

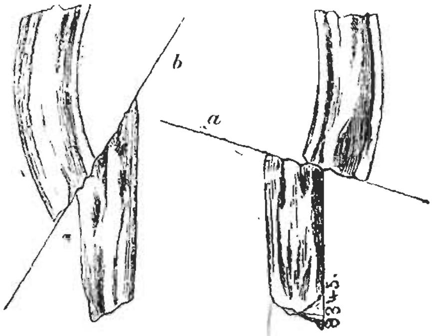
DISEASES OF THE TEETH.

Speaking generally, actual disease of the teeth is not of common occurrence in the horse—that is to say, it is not nearly so common as many owners are led to believe. The principal troubles are irregularities, malformations. decay, and inflammation of the lining membrane of the tooth-socket. Irregularities of the teeth are easily accounted for from what has already been said regarding their composition. Substances of unequal density and hardness will naturally tend to wear irregularly, especially should the animal have to masticate comparatively hard food, such as oats and other cereals, for it must be borne in mind that grass alone is the natural food of horses. Further, the normal conformation of the mouth and the arrangement of the teeth also promotes irregularity in wear. In the ordinary way the wear of the grinding-surfaces is regular, but if for any reason one or more of the teeth fail to undergo the normal process of wearing down, such teeth, or the parts of them which escape wear, will become too long. In such cases wounds or abrasions of the cheek or tongue may be caused by the projecting portion of the tooth. Owing to the arrangement of the teeth already explained, the upper molars will tend to inflict injury to the cheek, while the lower teeth will. in the same manner, abrade and wound the tongue. The pain and inconvenience following such injuries will cause the animal to only partially masticate its food. Much of the food will be dropped or "quidded," and the remainder bolted in an imperfectly prepared condition, and will be likely to give rise to symptoms of indigestion accompanied by colic.

Increased salivation as a rule takes place whenever wounds of the mouth occur, so that slobbering, quidding food, and loss of condition help one to recognize the source of the trouble. In such cases removal of the portions of offending teeth by judicious use of the rasp is indicated. Occasionally it may be necessary to cut away the overgrown teeth by means of a chisel or forceps, reducing them to a common level. Wounds inflicted on the mucous lining of the mouth may be washed and kept clean with boracic-acid lotion. Soft food should be given during treatment.

Other anomalies met with as regards irregularities and malformation of the teeth are the so-called "shear-mouth" and "step-mouth."

Shear-mouth is a condition produced by excessive obliquity of the wearing-surface of the molar teeth, the outer edges being abnormally low, the inner too high. All the teeth of one side may share in this defect, or only odd teeth may be affected. This condition is more often met with in aged animals. Imperfect mastication and liability to wound the opposing soft structures obviously follows in cases of shear-mouth. In treating this condition recourse must be had to the rasp or tooth-shears, depending upon the extent of the irregularity.



GRINDING-SURFACES.

IN SHEAR-MOUTH. IN NORMAL MOUTH.

Step-mouth is so called on account of the arrangement of the teeth resembling the form of steps, a short tooth having as its fellow a long one, and so on. Unequal hardness of the teeth is responsible for this condition. In bad cases it may be necessary to reduce the teeth to a normal level by means of tooth-shears, the rasp, as a rule, not being sufficiently effective in well-marked conditions of step-mouth.

Teeth may become prematurely worn owing to defective quality of the substances composing them, and also by habitually feeding on hard, coarse food. In certain cases the teeth even in young animals may be found completely worn down. This condition is occasionally seen as the result of indiscriminate and excessive use of the rasp. It is a serious defect, since the constitution of the animal will necessarily be impaired as a result of inability to properly masticate the food, and consequent digestive troubles. In such cases efforts should be directed towards saving what remains of the teeth by means of giving soft feed, such as crushed oats, carrots, and green stuff, thus lessening the amount of work the already worn teeth are called upon to perform.

Dental Decay.—Decay, strictly speaking, is not a commonly noted disease of horses' teeth, but, owing to the facility with which it may be overlooked, it is possible that more cases occur than are generally supposed. Decay takes place in the softer structures such as the dentine and cement, resulting in their degeneration and ultimate destruction. The table or wearing-surface is first attacked, the disease extending downwards into the cavity of the tooth. The tooth may become hollowed by decay and yet remain unnoticed owing to the enclosing wall of hard enamel which has resisted

the destructive process. Finally the enamel generally cracks, and the tooth splits, the resulting pain and discomfort manifested drawing attention to the condition. The cause of decay is usually associated with an acid secretion in the mouth acting on the softer tissues of the tooth, and permitting micro-organisms, with which the mouth always swarms, to exercise their malign influence.

There can be no question that horses are much less prone to decay of the teeth than are flesh-eating animals. Probably this may be accounted for by the fact that the teeth of the former being in a state of constant wear, the same surface is not exposed continually to the influence of the agents responsible for producing decay. Perhaps also the normal alkalinity of the saliva in the horse, and the less liability to formation of acid secretions in the mouth, may also account for its relative immunity in this respect. Extraction of the decayed tooth is the only practical means which can be adopted in the case of the horse, as, owing to the peculiar wearing-properties of the teeth, stopping or filling, as practised in human dentistry, would not be followed by successful results.

Inflammation of the Lining Membrane of the Tooth-socket.—This is not a very uncommon disease of the horse's mouth. The fibrous membrane, or periosteum, as it is technically termed, by its attachment to the teeth and jawbone, holds the former firmly in position. The periosteum is reflected into the tooth-socket, which it completely lines, and surrounds the root of the tooth. The consequences following inflammation of this membrane can readily be imagined. First, there is the pain caused by the congestion of the blood-vessels and pressure on the nerves by the inflammatory products in the unyielding bony tooth-cavity. This is followed by loosening of the tooth and suppuration, resulting from the introduction of micro-organisms, which gain access to the tooth-socket and destroy the root of the tooth. Various causes contribute to produce this condition. Among the more frequent are the persistent lodgment of food in between irregular or imperfectly worn teeth, and any injury sustained by the teeth, either by accident or through the improper use of instruments, which may wound the gum or loosen the tooth. Attention to this condition is attracted by the behaviour of the horse. He is inclined to masticate only on the sound side of the jaw, slobbers, and allows masses of food to accumulate between the cheek and the diseased teeth. Manipulation along the external side of the jaw often gives rise to symptoms of pain. Examination of the mouth will reveal the gum swollen, and one or more of the teeth loose ; this condition being accompanied by the characteristic fœtid odour invariably associated with bad teeth. As a rule old horses are more commonly affected by this disease than younger animals.

Treatment consists in the removal of the diseased teeth, whose roots may be underrun with pus. This operation can in certain cases be comparatively easily accomplished, or, on the other hand, may present the greatest diffi-

culty. Specially devised forceps are employed for the purpose of extracting molar teeth, but sometimes, owing to the tooth having broken off short, or to its being much decayed, these cannot be utilized with success. It then becomes necessary to trephine or remove a portion of bone over the area of the fang of the diseased tooth, exposing the root. Then, by means of a punch, efforts are made to forcibly detach it from its position in the tooth-socket. Needless to say, the successful performance of this operation demands a thorough knowledge of the anatomy of the part, and the administration of a general anæsthetic, such as chloroform. I have known of some lamentable failures following attempts to extract teeth in this manner by unskilful operators. Such operations should only be undertaken by experienced veterinary surgeons.

Before concluding these remarks I would refer to the question of "lampas." So much has already been written by veterinarians on this condition, and particularly against the practice of operating on it by firing, that my only excuse for again introducing the subject is the knowledge that the practice is still rife in this country. It is perhaps necessary to explain that lampas is a condition of inflammatory congestion affecting the palate immediately behind the upper incisor teeth, due to shedding of the temporary and the eruption of the permanent teeth. Less commonly, in older animals, its appearance may be the result of digestive disturbance or feverish conditions.

The only treatment necessary for lampas is to allow the affected animal, if stabled, soft food, such as bran mashes, scalded oats, &c., until such time as the inflammation subsides, as it will do of its own accord. A dose of physic will also often prove beneficial on these occasions. In the case of animals running out, if plenty of good grass be available, they should not be interfered with in any way. If, however, the herbage be poor, they may be given daily a bran mash and scalded oats, or linseed, or, better still, some succulent green food, such as green oats, which will be more readily eaten by the grass-fed horse. In quite exceptional cases light scarification of the inflamed part may be permissible, the slight local bleeding being often followed by relief. Owing to the arrangement of the blood-vessels in this situation, however, this otherwise simple operation should never be attempted by the inexperienced, or alarming, and even fatal, hæmorrhage may result. The practice of firing or burning out lampas, which I regret is only too frequently resorted to, is an outrageous act of cruelty calling for the condign punishment of the perpetrator. I have known people, who, generally speaking, were lovers of animals, allowing their horses to be subjected to this barbarous treatment at the hands of a blacksmith. Such thoughtless cruelty is the natural outcome of an ignorant and apathetic state of mind, which does not seek to inquire into the true nature of the condition, nor to consider what may be the ultimate consequences of such inhuman methods. One of the consequences of firing, it may be mentioned, is the permanent

disfigurement and destruction of certain of the ridge-like elevations present on the roof of the mouth, whose design is to assist the horse to pick up and retain food. No good is ever accomplished by the stupid act of firing, which can only result in laying the foundation of a weakened constitution.

Finally, let me warn all who have the interests of the horse at heart against individuals who, though possessed of no professional qualifications, style themselves "equine dentists," and scour the country armed with a formidable array of instruments, inflicting often needless suffering and sometimes irremediable injury to the teeth and mouth.

I venture to hope that these remarks may possibly assist owners in forming an opinion as to the condition of their horses' teeth, and, by arousing attention in the subject, afford them indirectly some protection from unskilful and even unscrupulous persons who thrive upon the lack of knowledge and credulity of the public.

NOTE.—Illustrations in this article are from Möller's "Veterinary Surgery."

IMPORTATION OF HORSES.

FOR some years the quarantine restrictions have not been enforced in regard to horses imported from North America, ability to pass the mallein test, as a guarantee of freedom from glanders, being all that has been required. Owing now, however, to the existence of certain diseases among horses in the United States, such as maladie du coit, epizootic lymphangitis, and infectious anæmia, the Minister of Agriculture, the Hon. T. Mackenzie, has decided that in future the full period of quarantine must be strictly enforced.

HORSE EXPORTATIONS.

THE following horses were shipped from the Dominion to Australia during March :—

From the Bluff to Melbourne : 74 *draughts,* 14 *entires,* 44 *mares,* 15 *geldings,* 1 *colt foal.*

From Wellington to Sydney : 524 draughts, 30 stallions, 244 mares, 249 geldings, and 1 foal; 10 thoroughbreds (6 stallions and 4 mares). Wellington to Melbourne : 615 draughts, 4 stallions, 52 mares, and 35 geldings.

From Auckland to Sydney : 13 *draughts.*

THE following were shipped from Auckland to Suva : 42 draughts.

A WARNING.

RECENTLY at Masterton a man named T. G. Lennox was fined £5 on a charge of using misleading initials after his name—viz., M.R.C.V.S.—without being entitled to such qualification. This is the second time he has been fined for posing as a qualified veterinary surgeon.

FROZEN-MEAT TRADE.

ADMISSION TO EUROPEAN COUNTRIES: REGULATIONS AND CONDITIONS.

The Live-stock and Meat Division of the Department has now received from its London officer, Mr. A. Crabb, M.R.C.V.S., several important communications in regard to the admission of frozen meat into Portugal and Switzerland. These include special reports on the matter by the British Consuls in those countries, the official regulations governing the importation of the meat, and, in the case of Portugal, the prices of beef in the Lisbon market.

Portugal.

Following is the report of the British Consul at Lisbon to the office of the High Commissioner for New Zealand in London:—

British Consulate, Lisbon,
1st March, 1911.

Sir,—With reference to my letter of the 26th January, 1910, relative to the importation of frozen meat into Portugal, I beg leave to inform you that the Customs duty of 200 reis (about 10d.) per kilo has recently been taken off, and there only remains an octroi duty of from 30 to 50 reis a kilo on introducing the frozen meat into the City of Lisbon.

The result of this measure has been that the firm named Grandes Armazens Frigorificos, mentioned in my previous letter, have begun importing frozen meat, and are selling it at the prices marked in the accompanying list.

With regard to the other information which you requested me to furnish in your letter of the 18th January, 1910, I have to state as follows:—

1. There are so far no regulations governing the importation from a public health or sanitary point of view. Examination of the carcases takes place on the entry into Lisbon, which is at present both the port of entry and the final place of destination. The kidneys only must accompany the carcases.

2. Duties to be paid on frozen meat: See paragraph 1 of this letter.

3. Ports of entry at which the meat can be discharged: Only Lisbon at present, but the company are negotiating for the purpose of acquiring a depot at Oporto.

4. Rolling-stock for the carriage of frozen meat: None at present, but negotiations are going on with railway companies with a view to the supply of special cars.

5. Cold storage: Only the stores of the Grandes Armazens Frigorificos, Lisbon.

6. Current retail prices of meat in Lisbon : See list in my previous letter, which is unchanged.

PHILIP A. SOMERS COCKS,
H.B.M. Consul.

Regulations governing Importation of Meat into Portugal.

Whereas for some years past there has been a growing scarcity of cattle in Portugal, entailing an increase in the price of meat, principally at Lisbon, where one-third of the cattle slaughtered in the country is consumed ; and whereas the Lisbon Municipal Chamber has pointed out the necessity of adopting prompt measures in order to satisfy the just demands of the Chamber, which tend not only to improve the food-supply of the capital, but also to benefit the economic condition of some of the overseas provinces, without disregard of the question of home production, the Government of the Republic, whilst reserving their rights according to circumstances to annul measures prejudicial to the national agriculture, make known that, in the name of the Republic, they have decreed the following with the force of law :—

Art. 1. Frozen meat may be imported duty-free, and the consumption dues on such meat are reduced to 30 reis.

Art. 2. Cattle as well as frozen meat from Portuguese colonies and destined for consumption in Portugal are exempt from export and import duties.

Art. 3. When, in view of the effect of Article 1, the value of the cattle bred on the mainland of the Republic has sensibly diminished, the Government are empowered, after consulting the Lisbon Municipal Chamber and competent Department of the Ministry of Agriculture, to raise the consumption dues on frozen meat so as to re-establish the standard price fixed for Portuguese cattle.

Art. 4. The Municipal Chambers which take advantage of the facilities granted under Articles 1 and 2 shall elaborate the requisite measures to regulate the conditions of importation, preservation, and sale of meat, fresh as well as frozen, having regard to hygiene and to the interests of the consumer and the dealer.

Art. 5. The Lisbon Municipal Chamber shall encourage in every way possible the importation of cattle from Portuguese colonies so far as required to supplement the deficiency in the home market, and shall provide that the cattle from abroad are properly distributed amongst the licensed dealers.

PRICE-LIST OF FROZEN BEEF.

First class.—Fillet, kg. 699 reis ; buttock, kg. 480 reis ; kidney, kg. 480 reis ; roast beef and rump, kg. 320 reis ; roast beef without fillet, kg. 320 reis.

Second class.—Buttock, kg. 300 reis.

Third class.—Ribs or shoulder, kg. 280 reis ; brisket, kg. 240 reis.

Fourth class.—Necks, flank, and shin, kg. 200 reis ; suet, k.g. 160 reis ; bone, k.g. 60 reis.

20 reis = about 1d.

SWITZERLAND.

Berne, 24th February, 1911.

Following is the special report to the High Commissioner from the British Consul for Switzerland :—

SIR,—I have the honour to acknowledge the receipt of your letter of the 14th instant, respecting the introduction of frozen meat into Switzerland. I beg to forward, for your information, copy of a decree of the Federal Council recently issued respecting this matter. From this is would appear that several previously existing impediments to the importation of frozen meat, whether from Argentina or elsewhere, have now been removed.

According to the Swiss Press, however, the improvements introduced by this decree, as regards facilities for importation and the removal of various veterinary obstacles, will still not make it possible to place frozen meat on the Swiss market at a price at which it could successfully compete with fresh meat. The general opinion is that it will be necessary to reduce the existing tariff on imports of frozen meat from 25 francs to 10 francs per 100 kilos.

This the Federal Council might do by a simple decree placing frozen meat in the same category as fresh meat, instead of in that of preserved meat as at present.

There is, it appears, a considerable agitation growing up among the cities in order to bring pressure on the Council to take this step, and the papers express the hope that the matter may be brought up for discussion before the Federal Assembly in the course of the next session in March.

ESME HOWARD.

The Resolution of the Bundersrat.

The Bundersrat passed, at its sitting on Saturday afternoon, the following resolution in respect of frozen meat :—

The Swiss Bundersrat, being supported by Article 21 of the order having reference to the examination of imported consignments of meat, &c., dated 29th January, 1909, resolves, on the motion of the Departments of the Interior and of Agriculture, as follows :—

Art. 1. The importation of sea-borne frozen meat is allowed by way of trial for inspection.

Art. 2. Requests for permission to import are to be made by the cantons to the Swiss Department of Agriculture. Information as to the granting of such permission will be given to the Department of the Interior (Health Office).

Art. 3. Permission to import will be granted only to such places as are able to avail themselves of the requisite cooling and freezing apparatus. Transport must be made in cold-storage trucks suitable to the purpose.

Art. 4. Consignments of sea-borne frozen meat, if not intended for the frontier station itself, shall be forwarded by the frontier Customhouse, without revision, with Customhouse certificate and under Customs protection, to the station of destination, where the final Customs inspection takes place. Consignments to places in which there is no Customhouse are to be reported upon in good time by the importer to the Upper Customs direction, in order that the latter can delegate a Customs official. The costs

incurred fall upon the importer. In place of the medical examination of the animals at the frontier (Article 10 of the above-mentioned order), examination is to be made by the veterinary surgeons appointed by the cantons for the purpose.

Art. 5. Only the flesh of cattle family and of sheep may be imported. The inclusion of the interior organs are not required in an importation made by way of trial. The importation is only allowed of cattle in halves or quarters and of sheep in whole carcases (that is, without heads).

Art. 6. The certificate of origin (Article 11 of the above-mentioned order) accompanies the consignment to the point of destination, and is to be given up to the meat inspector there, who will retain it for at least a year. During this period these certificates cannot be obtained by the countries of origin for inspection. The Department of Agriculture is therefore empowered until the 1st of May of this year to recognize as valid such official certificates as do not correspond in all respects with the instructions of Article 11.

Art. 7. Frozen meat is to be distinguished by a square stamp, the length of which must be at least 4 cm., and bear in Latin characters the name of the community, and above the word "Gefrierfleisch" (frozen meat).

Art. 8. Frozen meat is to be under the daily control of the Inspections Committee of the locality in which it is being sold.

Art. 9. In all localities in which frozen meat is offered for sale its kind and origin must be clearly pointed out in a manner easily perceivable by the public. The cantons can draw up their own orders as to the methods of sale and marks of distinction. They can also prescribe that the sale can only take place in certain localities.

Art. 10. The use of frozen meat for sausage-meat is forbidden.

Art. 11. In conclusion, the intentions of the order having reference to the examination of imported consignments of meat, slaughtering, inspection of meat, and trade in meat, dated 29th January, 1909, remain in force unaltered, and apply to frozen meat.

As to the question of rate of duty, the Bundersrat were divided in opinion; we hear that four members spoke for a duty of 25 fr. and two for a reduction to 10 fr. The former rate of 25 fr. remains, therefore, in force.

[The duty is 25 francs (25·15 francs = £1 sterling) per 100 kilograms (200 lbs. weight), or a little over 1d. per pound.]

ARGENTINE TRADE WITH BRITAIN.

The Commerce and Tourists Division of the Department of Agriculture, Commerce, and Tourists has received the following cablegram from Buenos Aires, dated 6th April, 1911:—

The following shipments of produce were despatched from the Argentine to the United Kingdom ports during March, 1911 (compared with March, 1910):—

	1911.	1910.
Frozen beef (quarters)	255,136	131,169
Chilled beef (quarters)	90,084	127,989
Frozen mutton (carcases)	159,876	179,098
,, lamb (carcases)	193,053	31,292

WEATHER AND AGRICULTURE.

D. C. Bates.

MARCH.

March was a very dry month in many parts of New Zealand, but some good falls of rain were recorded in various parts. The weather was, on the whole, remarkably fine and warm, the winds moderate, and the barometer above the normal for the month in all parts of the Dominion.

Two westerly storm-areas passed in the south on the 21st and 28th, but, from what had been experienced on the Tasman Sea, were diminishing both in area and intensity. Neither of these disturbances was much felt northward of Cook Strait, but heavy gales were reported further south, with rain and flooded rivers on the West Coast.

Rainfall for the Month.

Departure from Normal for the Month, + above, − below.	Station.	Total Fall.	Number of Days Rain fell.	Maximum Fall, and Date.
	North Island.			
In.		In.		In.
− 0·83	Pakaraka	2·90	9	1·38 on 22nd.
− 0·50	Auckland	2·32	11	0·70 „ 5th.
− 4·58	Waiuku	1·00	11	0·25 „ 5th.
− 6·24	Waihi	2·70	12	0·92 „ 22nd.
− 3·51	Hamilton	0·47	6	0·16 „ 22nd.
+ 0·47	Gisborne	4·58	7	2·30 „ 17th.
− 3·93	Meeanee	1·46	4	0·82 „ 3rd.
− 2·78	New Plymouth	1·01	7	0·58 „ 3rd.
− 6·15	Inglewood (Taranaki) ..	1·52	7	0·96 „ 3rd.
− 2·72	Wanganui .. .	0·26	2	0·23 „ 18th.
− 2·74	Levin	Nil.	..	..
− 3·12	Wellington	0·34	8	0·10 on 22nd and 28th.
	South Island.			
− 3·36	Nelson	Trace	..	..
− 1·78	Hokitika	8·34	12	2·26 on 21st.
+ 6·35	Okuru	23·62	16	6·76 „ 28th.
− 3·67	Highfield (Amuri) ..	0·32	2	0·24 „ 10th.
− 2·51	Lincoln	0·20	6	0·10 „ 30th.
− 0·38	Kapunatiki	0·20	5	0·14 „ 30th
− 0·52	Oamaru	1·30	5	0·52 „ 31st.
+ 0·31	Balclutha	2·46	7	1·44 „ 16th.
+ 0·88	Dipton	3·52	10	1·28 „ 31st.
− 0·05	Invercargill	3·26	12	1·36 „ 31st.

DISTRICT NOTES.

North Island.

Whangarei Heads.—During the month of March very fine weather was experienced, with just enough rain to keep the grass green. The equinoctial gales were very light (from the south), and lasted only two days.—(*F. J. McKenzie.*)

Helensville.—Too dry a month for farmers generally. Milk-supply has fallen off very rapidly at creameries. A great deal of grass-seed has not germinated, owing to shortage of rainfall.—(*A. J. Hill.*)

Rangiahua, Hokianga Harbour.—A very heavy storm, with thunder and lightning, occurred on the afternoon of Saturday the 4th, from 2 till 4 p.m., during which period the rainfall was 1·62 in.—(*W. R. Coxhead.*)

Waihi.—The month of March was remarkable for the abnormally low rainfall precipitated. Persistent anti-cyclonic conditions appear to have proved an effectual barrier to these tropical storms which, as a rule, are looked for at the time of the autumnal equinox, and which are a feature of the meteorology of this portion of the Dominion. Consequently, water-power is reduced to a minimum, and the water-supply is very low. Vegetation looks better than was to be expected, due to the remarkably small wind-movement and consequent low rate of evaporation, coupled with the copious dews experienced, and frequent fogs. A very high average of bright sunshine. Mean temperature slightly below normal. Night temperatures showed a rise over February. Earth temperatures at 2 ft. averaged 64·1° Fah.—practically the same as for February.—(*H. B. Devereux.*)

Taumatatahi.—This is, I think, absolutely the driest month on record for this district.—(*E. F. Liffiton.*)

Kaitieke, Raurimu.—The weather for March was dry, wind rather quieter than previous months, and fair amount of dew. Of rain there were some very light showers of no consequence.—(*H. C. Wedde.*)

Erewhon Station, Moawhango.—A very warm, dry month; weather generally close during day, but cooler at night. Barometer high and steady the whole month. Rain still required. (*R. G. Hustwick.*)

Hiwi, Taihape.—The month has been the driest and hottest of the summer, the mean maximum temperature being 69·6 and the rainfall only 0·17 in. There are a good many fires burning, but, thanks to the absence of wind, they have not, on the whole, been very troublesome. The country is dry, and feed and water quickly becoming scarcer. During the dry summer of 1907-8 the rainfall from 1st September to 31st March was 21·83 in.; for the same period this season the rainfall is 16·26 in. The honey crop has been a fairly good one; there was too much smoke towards the latter end of the season for the bees to work at their best.—(*A. R. Fannin.*)

Ormondville.—Weather very dry and warm, even for autumn. Very little growth in pasture. Streams all low. Aphis working great havoc among cabbages and turnips.—(*F. B. Curd.*)

Waitatapia, Bull's.—A record dry month. Very little feed left for stock; all rape and root crops blighted.—(*K. W. Dalrymple.*)

Waituna West, Feilding.—March has been hot and dry—very dry, in fact; the rainfall has been the lowest of any month since January, 1908, when exactly the same quantity fell. Water is getting very scarce, many

of the settlers having to drive their stock some distance for water. Feed also is scarce, and is dried up. If we do not get rain shortly, winter feed will be a very serious question this year. Should rain fall within a week or so, and the frosts keep off, no very serious damage will be done, for the grass will come away again owing to the heat of the ground. The atmosphere has been very smoky during the greater part of the month.—(*J. Guylee.*)

Pahautanui.—The temperature during the past month has been fairly regular, ranging from 61° to 70°, but the last few days have been warmer than is usual at this time of the year, sometimes reaching summer heat after midday. The rainfall, however, has been much below the average for the past five years. Rain has been much needed, and a scarcity of winter feed will probably be the result, with heavy loss of stock in many parts of the Dominion. On the night of the 24th there was indication of a light frost, and tender plants bore evidence of it in the morning. Unusual absence of wind prevailed during the equinox.—(*J. Pearce.*)

Waitakaro, East Coast.—During the last six months, when all New Zealand, even as far up the coast as Gisborne, was crying out for rain, the locality was regularly supplied with a sufficiency, there being no symptom of drought, and a vivid freshness all through the summer. The autumn has been very moist and warm so far, and plum-trees have put out a fine show of blossom. They are following now with leaves. I have a couple of trees under observation to see how this ill-timed awakening will affect their future.—(*C. Mahoney.*)

Pine Grove, Dannevirke.—Since the 3rd July very little rain fell. The latter part of the month has been very dry. It has been very hot during the month. Rain is badly needed; there is almost no cattle-feed in this part of the country; unless rain falls soon there will be but a poor outlook for winter feed.—(*Dr. J. E. Riddell.*)

Tawataia, Eketahuna.—Very warm, dry month.—(*T. H. Groves.*)

Eketahuna.—The hottest and driest month this summer. The oldest settlers here say that it is the driest March they have experienced. This part of the country is beginning to look dry, and in consequence milk supplied to butter and cheese factories shows a considerable falling-off compared with same month in former years. Rain is badly wanted.—(*J. T. Quinn.*)

Annedale, Te Nui.—Very dry month, especially the last week, when it was drier than any other part of the summer, and in the bush there were large fires. The creeks are lower than usual at this time. I have seen more kingfishers than usual this month: the blackbirds and blight-birds have been remarkable for their absence among the pears and apples.—(*H. A. Nevins.*)

Ditton, Masterton.—The driest March month ever recorded by me during thirty-one years' observations. Owing to good rain towards the end of February, and heavy dews and absence of drying winds during March, the grass is in very fair order, and stock in good condition. Mean maximum nearly 5° higher than February.—(*S. Mawley.*)

South Island.

Robin Hood Bay.—Most unusually dry and hot month. Temperature at 9 a.m. in the shade well over 60°. Little growth; bad month for fattening stock.—(*Henry Stace.*)

Pakawau.—The driest March since record has been kept in Pakawau. Though this March has been so dry, the feed has not been so short as might have been expected, as there has been very little wind and many cloudy days.—(*T. C. V. Field.*)

Mount Torlesse, Springfield.—Small drizzles and fog every night during past three weeks. Unusual absence of north-west weather. Great growth in grass and turnips.—(*P. H. Johnson.*)

The Heights, Geraldine.—Hot and very dry month. Grass paddocks bare.—(*W. M. Moore.*)

Pleasant Point.—Very hot, dry month. All kinds of vegetation suffered severely. Feed for stock very scarce. A few light showers on 30th; everyone hoping for more.—(*J. Bishop.*)

Trotter's Creek, Hillgrove.—The intermittent rain and drizzle, with fairly high temperature and calm atmosphere, which commenced on the 28th and lasted to the end of the month, completely broke down the drought conditions existing here in an intensified form since the 25th January, but it has come too late to make any material difference in the prospects for winter feed, and as a general thing stock will have a fairly hard time in North Otago for the next six months.—(*W. S. D. Trotter.*)

Bushey Park, Palmerston South.—During the four weeks of the month the drought was very severe. Settlers were driving their stock to the rapidly shrinking river, and at the same time carting water for household use. Here the springs ran freely all the time, but this was exceptional. There was not much wind, but both day and night temperatures ranged high, especially during the third week. Light rain began to fall on the morning of the 29th, and still continues (1st April). Already the grass is springing, and the root-crops are considerably freshened up.—(*Mrs. J. J. McKenzie.*)

Lynton Downs, Kaikoura.—The fine weather experienced in this county (Kaikoura) during the month of March has been most welcome. Previously we had too many days of wet and foggy weather, which caused plenty of grass lacking substance, but during March the grass has kept on improving in quality, and not decreasing in quantity to any extent. The sun's heat has been more like that of late January and February. With the exception of one day, no strong wind (north-west) has been felt.—(*T. Harrison.*)

Gladbrook Station, Middlemarch.—This has been a very serious month for all concerned, but the drought is now completely broken. The maximum thermometer was 91° in the shade on the 15th, and the minimum 29° on the 11th. On the 27th the southern lights were very bright about 7.30 p.m. On the 28th we had a severe north-west wind. If the frost keeps away now there will be a fair growth yet for stock.—(*Alex. McKinnon.*)

Lower Crawford's, near Alexandra.—The weather from the 1st to the 28th of the month was exceptionally dry, only 6 points of rain falling during that time. A foggy rain set in on the 28th, and since then has continued off and on. Since the 28th 67 points have fallen, which will start grass to grow for winter feed, though in most cases it will be too late for turnips. We had two severe dust-storms, also an earthquake, during the month.—(*J. C. Buchanan.*)

Riverton.—The month of March on the whole has been an excellent one. We practically escaped the equinox, there being but moderate winds from the north-west and west. I might add that although we got the rainfall

from the storm predicted for the 28th. the wind came from the east; we escaped the storm from the west completely. It appeared to strike the west coast, and then travel inland. The welcome rains have resuscitated all vegetation, and turnips which were feeling the dry wather will to all appearances be better crops. There was a very fine display of the aurora on the 27th.—(*J. Gearey.*)

Chatham Islands: Whangamarino.—The past month's return shows very little range in barometer and thermometer. We had a very stiff breeze or gale on the 26th, but otherwise the wind did not vary much, being for the most part westerly. On the 29th and 30th the north-west winds brought a considerable amount of smoke from the north of New Zealand. On the 29th in particular the air was so filled with smoke that the houses at the Port of Waitangi, a mile distant, could not be seen, and the smell of burning wood was quite noticeable. We have had a little over 1½ in. of rain, mostly during the first week, but the herbage is now looking fresh and green. The potato-yield is very good this season, there being very little blight now to be seen, not sufficient to affect the crop to any extent.—(*F. A. D. Cox.*)

CROPS, PASTURES, AND STOCK.

Generally the position in the North Island last month was little improved over that of February from a winter-feed viewpoint, while the good Easter rains came too late for many sections. Owing to the continued dry weather and the ravages of blight, turnips are a complete failure with the exception of small areas in Auckland, Taranaki, and some fair crops in the Wairarapa. Rape has also fared badly, club-root combining with the dry weather to bring about failure. Some good crops of thousand-headed kale have been secured here and there, and this where rape and turnip crops were wiped out. Maize has proved the salvation of many a milk-producer, but, unfortunately, too many did all their planting at the one time, with the result that a large proportion of the crop became dry and ripe before it could be used. Pastures generally are very dry, with the exception of those near Mount Egmont in Taranaki, and in portions of the Forty-mile Bush district. The hill country is carrying decent feed, excepting some of the drier papa country and the hills towards Hawke's Bay.

In the South Island the drought has been more severe in certain sections than in the North Island. Crops, on the whole, are exceptionally light. In Canterbury heavy nor'-westers did considerable damage to ripened grain crops. The dry weather also affected the root and rape crops, and the green fly has done a lot of damage. Pastures were dry and burnt up during the month, and the Easter rains were rather late to save the position, as they proved the introduction to colder weather. Farmers in many cases put in green feed, and the rains should make this a valuable asset. Southland pastures are in much better heart than those of other districts. A light rain at the end of March in Otago and Southland, followed by warm weather, benefited the pastures considerably. While the dry weather and aphis practically ruined all the rape crops in Otago, these were kept moving by occasional showers in Southland, and as a nice rain fell in the middle of the month they should afford good feed for the winter. The loss to farmers in North Otago, where the drought has been disastrous in its effects, owing to the potato-moth, will be most serious.

POULTRY-KEEPING.

THE REARING OF CHICKS.

F. C. BROWN.

The rearing of the chicks is the most important branch of poultry-keeping, especially with artificial means, which must be adopted when incubator hatching is practised. More breeders fail because they cannot rear the chicks than from any other cause.

BROODERS.

Brooders are of four styles. There is the indoor-box brooder, and if of a reliable make this keeps the most uniform heat. The outdoor-box brooder is on the same principle as the indoor, but in addition is made watertight: it is not recommended for use out of doors in early hatchings, as the chicks have then to be too often boxed in, and do not get sufficient exercise. The proper place for a brooder is in a house built for the purpose, with runs attached. This is best not only for the comfort of the chicks, but also for the attendant in rough weather. The sectional-pipe indoor lamp-brooder is of many makes and designs: it requires rather more skill to manage than the box brooders, but can be recommended for medium-sized plants. The larger pipe system, heated with coal or coke, is only suited for a large plant.

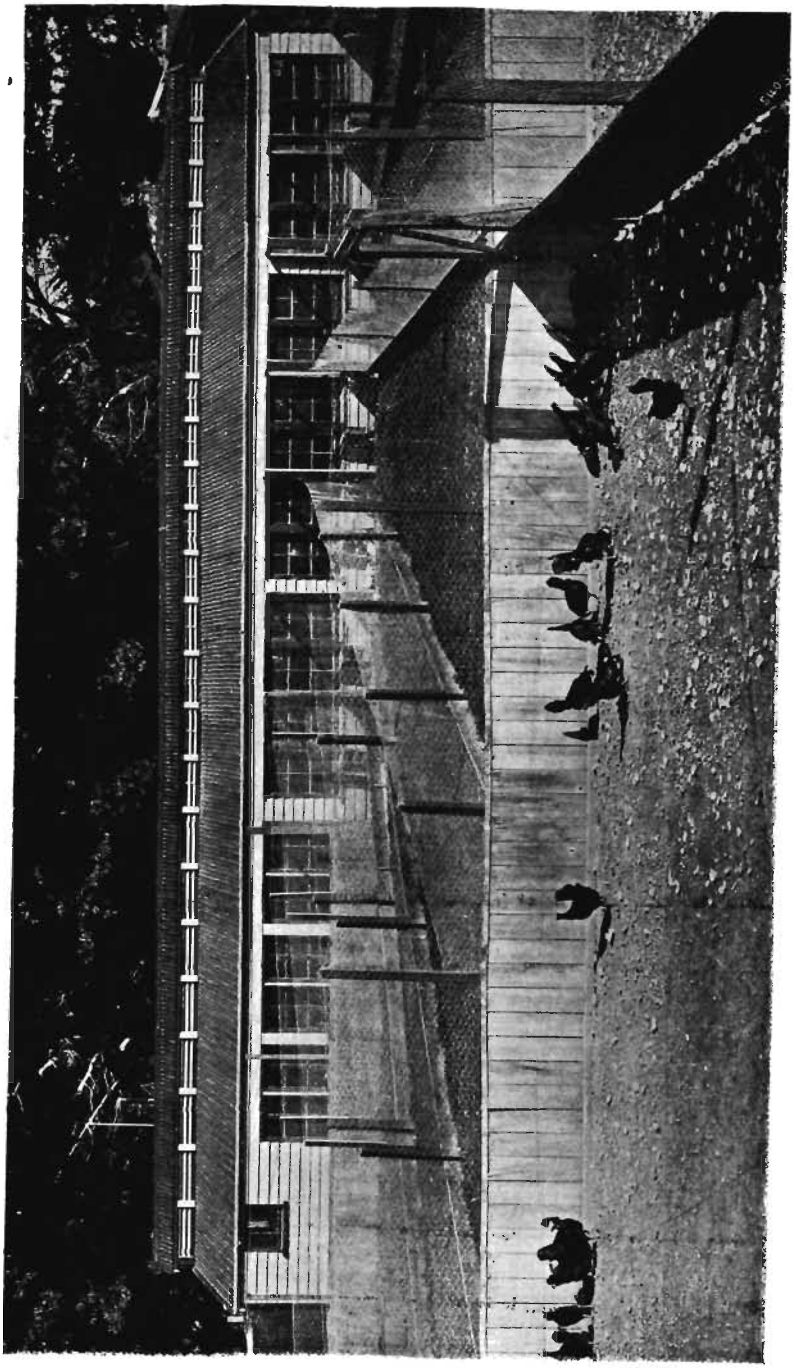
In a brooder there should be practically two compartments—one where the artificial heat is provided, and a front compartment separated by a curtain. The necessary warmth must be always available, while there must be provided different degrees of temperature and a ready means of the chickens being able to secure the degree of heat or coolness they instinctively demand.

Undoubtedly the failure to provide a means of getting away from the heat when it is excessive, which frequently happens on a hot night, is the most frequent defect in the construction of a brooder.

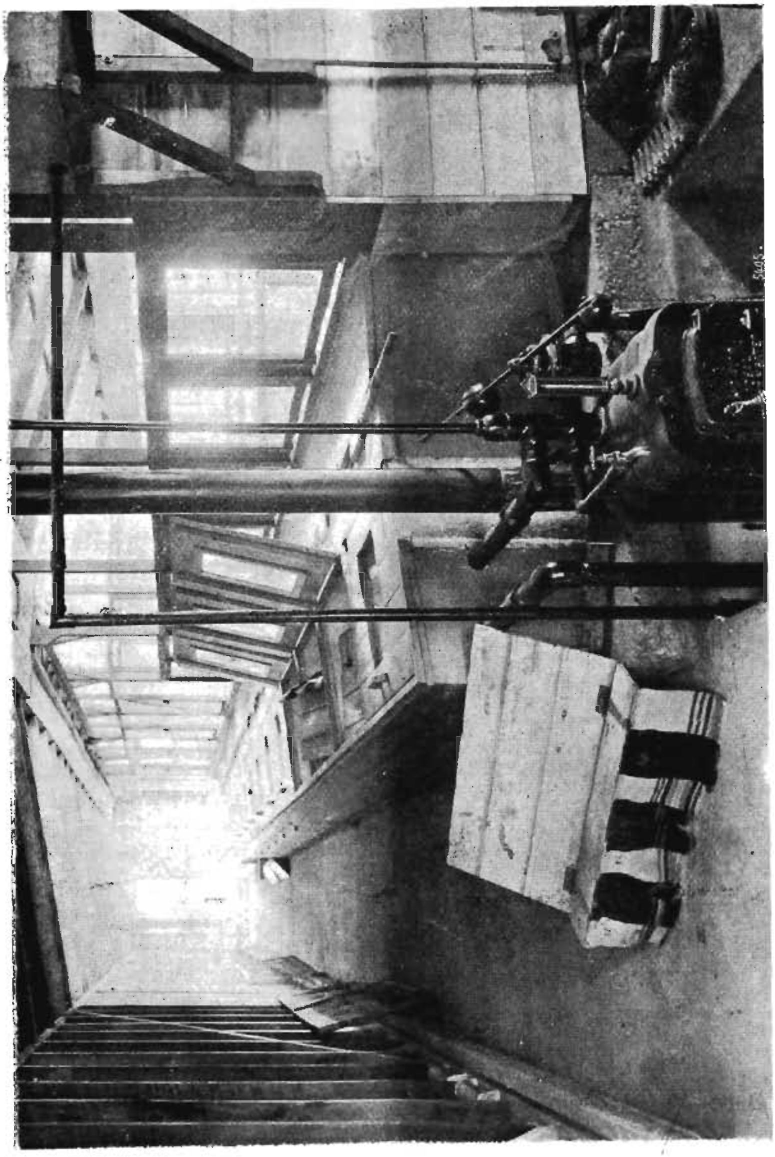
Ample ventilation is imperative. Some brooders are so constructed that ventilation is not only absent but the warm air is confined: the temperature, as a consequence, is the same in all parts of the brooder. This means that the chick is all the time in an unhealthy atmosphere, and is unable to secure not only the temperature which nature demands, but the fresh air required. The breeder should study chickens under the hen. There he will see that while the bodies are sheltering in the warmth of the mother, the little heads are peeping out so that the outside atmosphere may be inhaled.

CARE OF YOUNG CHICKENS.

It is of the utmost importance that chicks shall not suffer a chill. Fully 80 per cent. of the deaths at the brooder stage are due to chill, caused by faulty brooders or poor management. A low temperature



Burnham Brooder House.
Outside view showing the system of fan-shaped runs.



THE IDEAL STOVE, WITH THE PIPE SYSTEM AND AUTOMATIC REGULATOR ATTACHED.

is less fatal than an irregular temperature. It often happens that a cold night sets in, or a cold early morning follows a mild night. In this case, unless a good heat is in the brooder—the heat of which, with the pipe system, generally weakens towards the morning—the chickens feel a greater need for warmth. They huddle together to make up, by the warmth induced by the bodily contact, for the insufficient artificial heat, with the result that they spread their legs in the huddling effort and at the same time become in a sweated condition. The effect of these evils is seen in leg-weakness and chill caused by change from the sweated state to the ordinary temperature. The huddling is intensified by insufficient covering on the floor and the pipes of the brooder being at too great a distance from the floor. If chicks are observed to be huddling it is a sure sign that the heat is insufficient. When the vitality becomes lowered, owing to chill and leg-weakness, the chickens rapidly fail. In addition to the spreading of the legs, their wings droop, and their general appearance indicates an unhealthy condition. They seem to demand greater heat—in fact, cannot have too much of it—and thereby neglect to take sufficient exercise, and become incapable of recovery. Healthy brooder chicks should be constantly on the move, running out to feed and occasionally back again to the artificial heat.

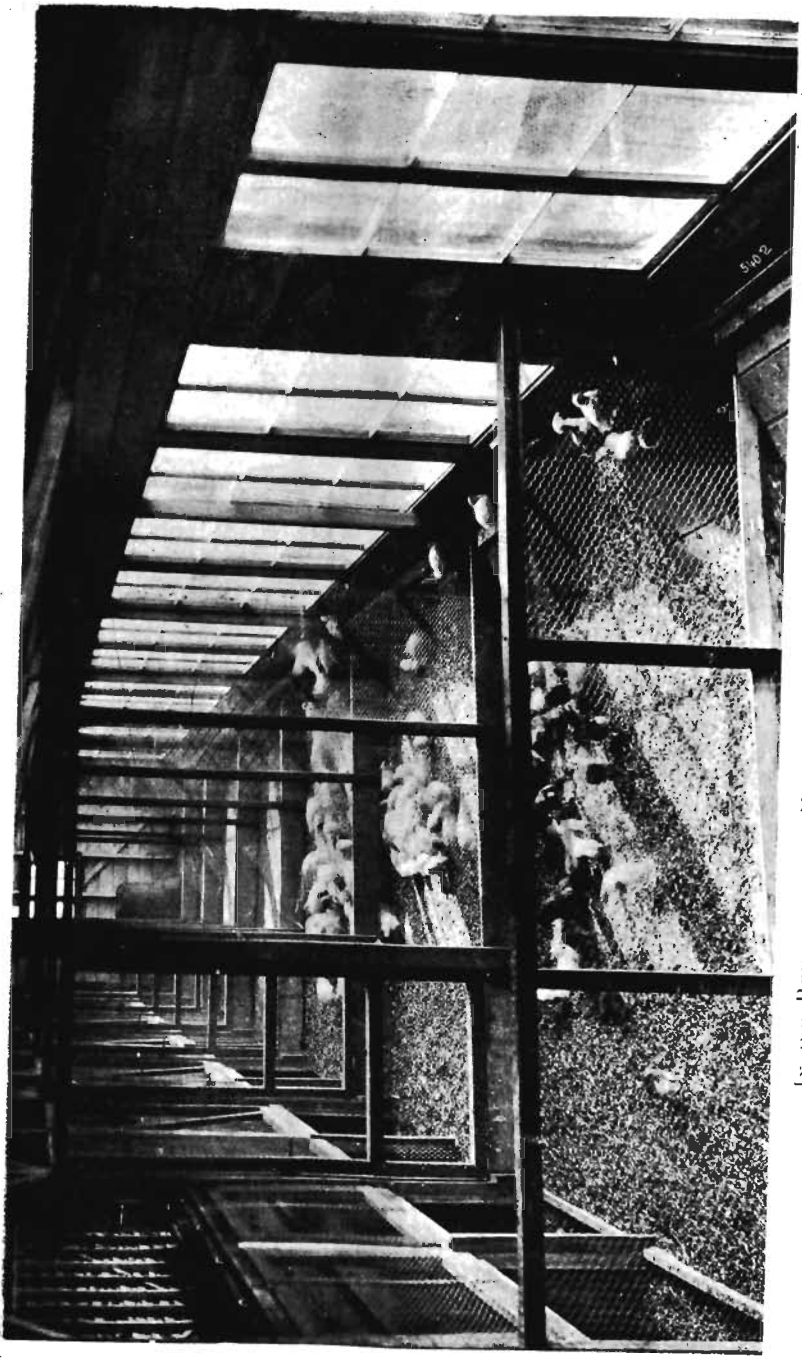
Do not allow chicks to get a chill when removing them from the incubator to the brooder. Use a piece of flannel or blanket to cover them. Chicks must be dry and well on their legs before being removed to the brooder. It is, however, a mistake to harden off chicks in the incubator. Have the brooder well heated and bedded with straw, chaff, dry earth, sand, sawdust, or pine-needles, and have it at a temperature of from 90° to 95°, the temperature being taken 2 in. from the floor of the brooder, with a gradual reduction of heat as the chicks develop. If you see them with their mouths open they are too hot; if they huddle, the heat is insufficient. The spreading-out of the chicks should be studied as well as the thermometer.

Keep the chicks in the brooder for the first three days, with a division in the brooder where fresh air and light may be obtained. Then give them a 2 ft. run for the first day or two, and increase this by degrees as they grow older. When allowed a lengthy run right away they are apt to lose their bearings, and, feeling the change of temperature, will huddle together and become chilled. It will be probably three days before the effect of the chill is observed, and then it will be in the form of droopy wings, feverish condition, and bowel trouble. The brooder cannot cluck, so teach the chicks by tapping to run in and out of the brooders, and thus to know where the hot and cool sections are. If they remain inside too much they will become overforced, and later on die like flies. Overforced chicks indicate their condition by developing long wing-feathers, leg-weakness, long and large feet. Exercise is necessary. The run should be well supplied with straw-chaff or litter, in which should be scattered broken grain-foods, to induce the chicks to scratch and keep busy.

Do not take the whole of the heat off the brooder during the day. Most brooder troubles can be overcome by studying nature. The hen gives the chicks a regular warm run on the hottest days, and at the same time allows them to breathe fresh air, but always keeps them under control. The brooder house must not be too hot. If it is, the chicks breathe too much hot air, which makes them soft. On the other hand, a change out of doors may be too great, and they may get chilled, the

THE VERANDAH IN FRONT OF BROODER.

With a hinged frame, whereby the chicks can be given a small airing-space for the first few days, the frame thereafter preventing the chicks getting on top of the brooder.



Inside Runs, showing Method of supplying Chicks with Water.

cause of most troubles. An even temperature in the brooder-boxes is the keynote to successful artificial brooding. More depends on regular temperature, ventilation, and cleanliness than on any particular method of feeding. Crowding under the most favourable conditions should be avoided, or the mortality will be great. A space 3 ft. square is generally claimed to be sufficient for sixty young chicks.

Before a new batch of chicks is placed in a brooder this should be well cleaned and disinfected. One part of carbolic sheep-dip to a hundred parts of water, applied with a whitewash brush, will serve for the purpose. If the surroundings are allowed to become foul or filthy, the presence of parasites, lice, mites, and other pests and diseases is encouraged.

No definite length of time can be stated for brooding chicks. Much depends on climatic conditions. During warm weather the hen will mostly "wean" the chicks when six or eight weeks old, but in cold weather they often require the mother's care much longer.

Have the brooder-house and chicken-coop ratproof. There is no gain by getting a good hatch of chickens or ducklings and allowing the rats to take them.

TROUBLES IN THE BROODERS.

Chicks pecking each other: This is mostly caused through want of something better to do. Give them pieces of tough meat to keep them running, also ample room for exercise, and they will soon forget any cannibal inclinations.

White diarrhœa: White diarrhœa mostly commences during the first eight or ten days, and is always caused by chill! This is sometimes due to removing the chicks too soon from the incubator (before they are dry), by placing them in a brooder with insufficient heat, or giving them too much liberty in the run. Chicks should not be removed from the incubator before they are thirty-six or forty hours old.

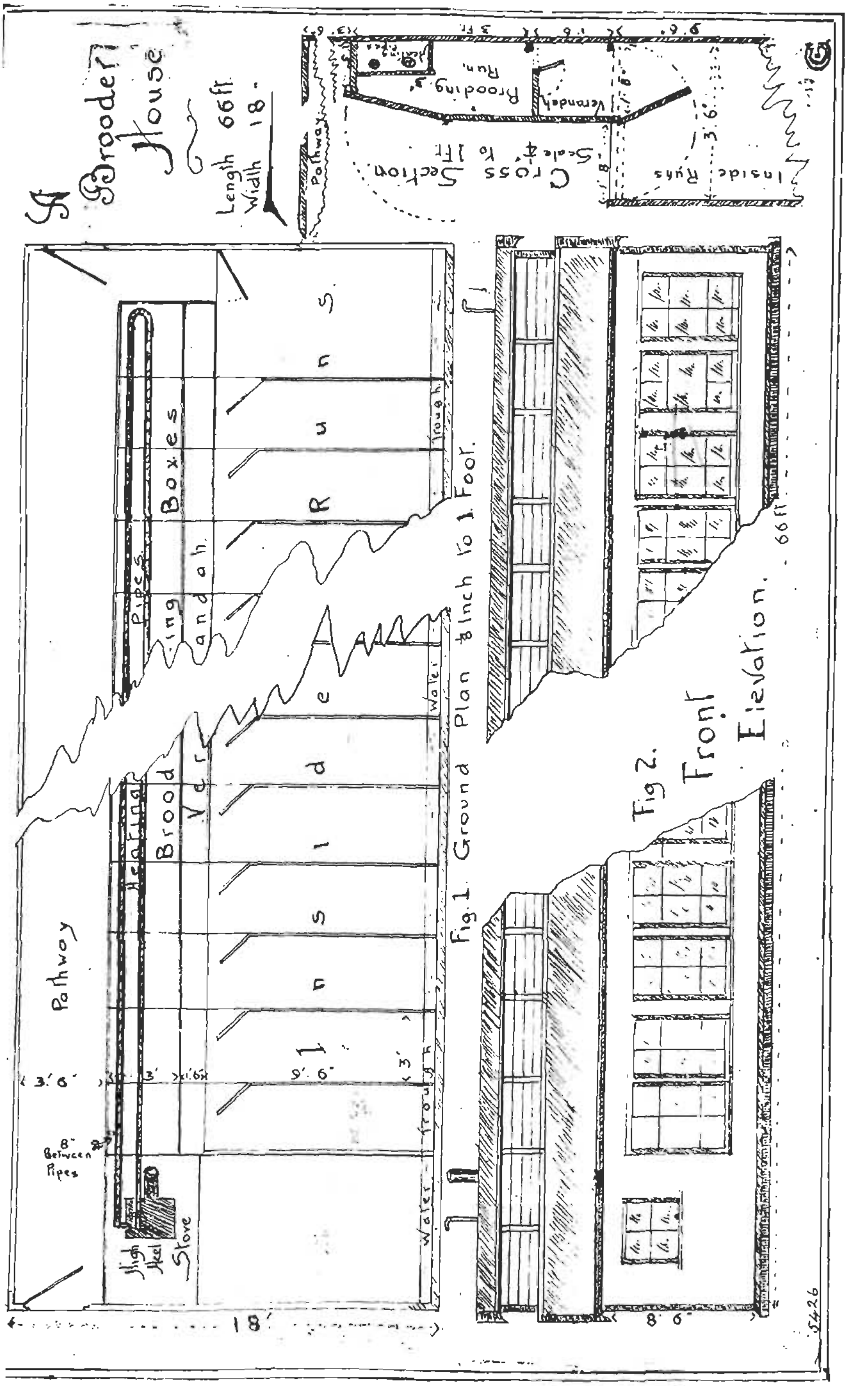
Balls of earth on chickens' feet are a trouble found in brooder chickens when the quarters are not kept clean. It is due to the caking of excrement about the toes and feet of the chicks, due to there being an absence of absorptive matter in the brooder to take up the droppings. The remedy is to run the chicks in wet grass. If no grass is available, place a shallow water-tray opposite the entrance of the brooder; by constant wetting the balls will soon fall off. Also make them scratch in the litter for their food. The cause, however, should not be allowed to exist.

Crooked breastbone is due to keeping the chicks too long under artificial heat, and also allowing them to roost too early. Inbreeding and breeding from delicate stock are also frequent causes.

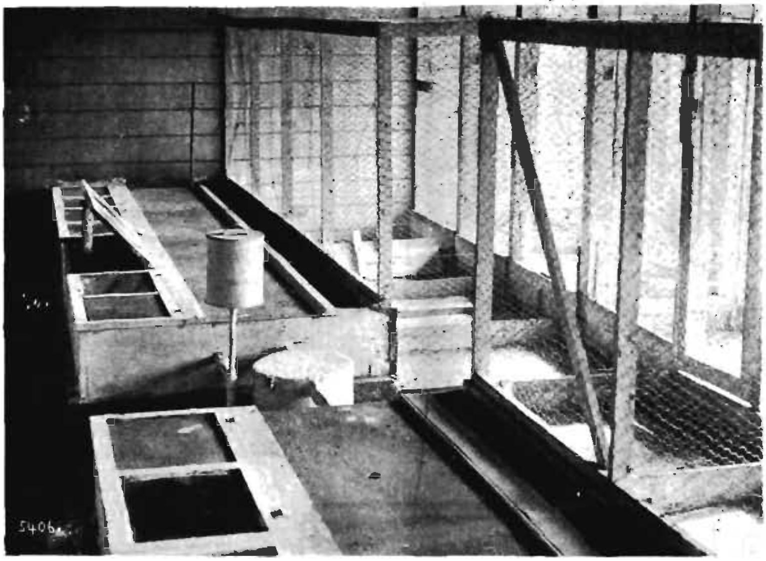
Leg-weakness in half-grown chicks is caused by overfeeding with animal food; overheating; insufficient exercise—often found in chicks that have been reared in a glass house. All these influences tend to overforce the body, which becomes too heavy for the legs to carry. The trouble of chicks being gummed up in the vent is caused by chill, overheating, or bad feeding.

FEEDING BROODER CHICKS.

No hard-and-fast bill-of-fare can be laid down for feeding young chicks. There are scores of different mixtures that will give equal results. Whatever grains are fed should be of the best quality, and gristed or broken to suit the age and size of the chickens they are in-

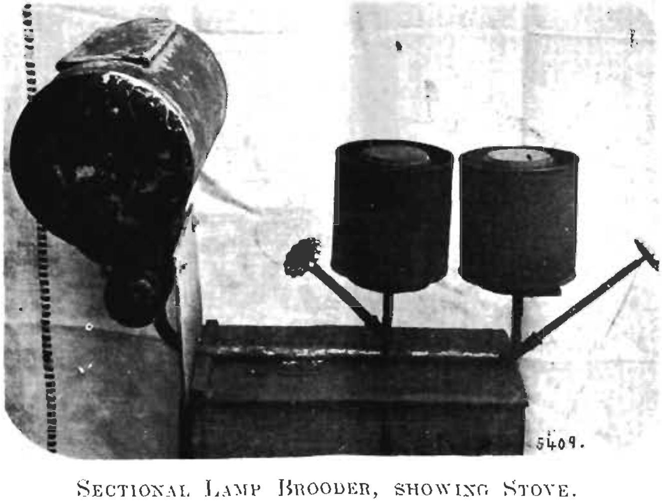


Working Plan.



SECTIONAL LAMP BROODER.

The illustration shows a sectional brooder designed at the Milton Station, and is strongly recommended for medium-sized plants. 30 ft. of brooder boxes may be thus heated by the means of one lamp. The length of brooder can be varied to suit circumstances. The timber used should be 1 in. boards, thoroughly seasoned. The pipes from the heater must have an elevation of 1 in. to 10 ft. The heat is supplied by means of a Perfection oil-lamp, the burner resting on a small box. The oil-reservoir holds sufficient kerosene for twenty-four hours. The lamp is placed in a pit under the tank, and can be easily taken out, filled, cleaned, and put back. With the exception of very cold nights, the one burner is sufficient to supply the necessary heat. The lamp must be kept clean and in good working-order, which can be easily done by following the instructions of the maker.



SECTIONAL LAMP BROODER, SHOWING STOVE.

tended for. Chicks require nothing to eat for thirty-six to forty hours after they are hatched. Nature provides for their existence during this time without food, and anything given them will do more harm than good. During the process of incubation, and up to just before breaking the shell, the remnant of the yolk in its sac is found outside of the body, with which it is connected through the navel. It is finally drawn into the body, digested, and absorbed, providing nourishment for the chick for the first few days. Traces of the unassimilated yolk may be found in the chick's body until it is a week or eight days old. Should chicks be fed too soon after hatching, or overfed during the first week, they fail to assimilate the yolk, which forms into a hard substance, they do not get their *natural* food, and consequently die within a few weeks.

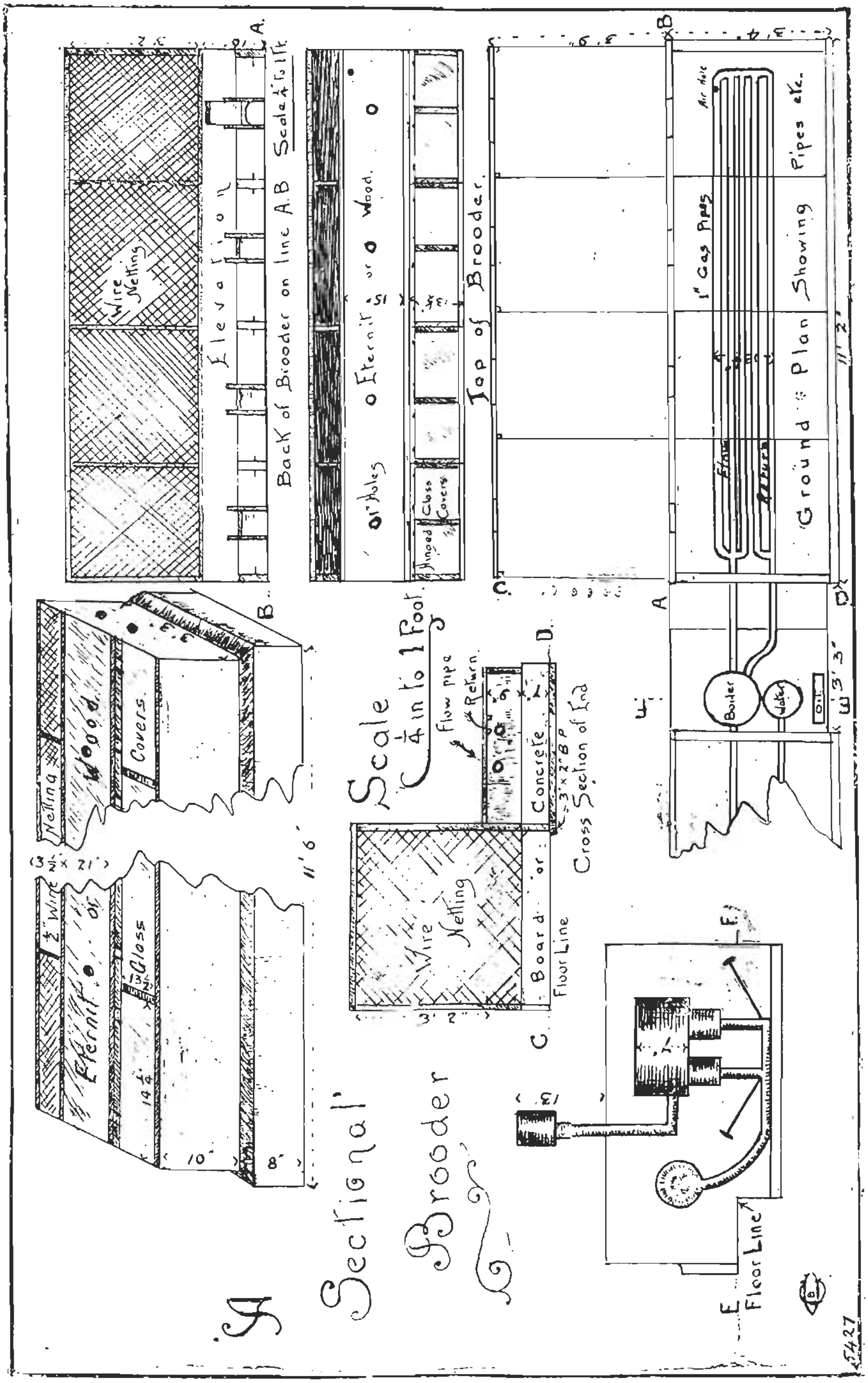
For the first two days chicks may be given dried coarse oatmeal sifted through a fine sieve: this will prevent the fine meal from being wasted. From the third day to the fifth day a little broken wheat should be added. This should be slightly moistened with a raw egg a short time before using: this will cause it to swell, and prevent it from doing so in the chicken's crop. From the sixth day and up to a month old the following mixture may be given: crushed wheat, 40 lb.; crushed maize, 15 lb.; hulled oats, 25 lb.; broken rice, 10 lb.; crushed peas, 5 lb.; canary-seed, 5 lb.

From the first, clean water, grit, and charcoal should be always before the birds, and fed separately. Green food, such as young grass cut fine, lettuce, cabbage, clover, &c., must be fed daily. After the chicks are a few days old give once a day to each twelve chicks an ounce of boiled meat that has been passed through a mincing-machine, and increase by degrees as they grow older. When the chicks are a month old, and until they can be given mash and whole grains, a good growing-food consists of equal parts cracked wheat, maize, and hulled oats: this mixture given with meat, green food, grit, and clean water is all that is required.

Succulent lettuce and other vegetables should be sown at frequent intervals to provide tender green food for young chicks.

When the chicks are five days old give them pieces of tough meat, in order to make them run in and out of the brooder for exercise. Chicks must have exercise and fresh air.

Chicks must be fed every two hours for the first week, and the intervals should be gradually lessened as they grow older. Feed only the best grains to chicks: inferior food is a penny-wise-and-pound-foolish policy. Frequent changes of food are not recommended, but the one class may be given in many different forms, such as moistening with milk at one time, soup another, and at times steaming. Only feed cut grass to young chicks when it is young and tender. When it is old and rank it contains too much fibre, and this forms hard lumps in the chicken's crop or gizzard. Do not have chicks of various ages running together, as the big ones will rob the younger ones of their share of food. When chickens are a few days old they will balance their own food if given a mixture of dry grains. It is a mistake to force them to eat what they do not like. The best guide is the manner in which they show their appreciation of the food provided. When it is observed that they are leaving one of the mixed grains this should be given in reduced quantity.


A Sectional Brooder
Scale 1/4 in to 1 Foot
Elevation
Back of Brooder on line A.B Scale 1/4 to 1 ft
Top of Brooder
Ground Plan Showing Pipes etc.
1" Gas Pipes
Flow
Return
Boiler
Water
Wire Netting
Eternit or Wood
Oil Holes
Hinged Glass Covers
Covers
Glass
Flow pipe
Concrete
Board or
Floor Line
Cross Section of End
11' 6"
11' 2"
3' 2"

COOL BROODER.

This illustration shows a convenient cool brooder-house for fifty chickens after the heat has been taken from them. Dimensions: 8 ft. long, 6 ft. high in front, 5 ft. high at back, 6 ft. wide; open wire-netting windows 4 ft. long by 14 in. wide, with a low verandah in front for shelter 2 ft. wide, 2 ft. high in front, and 3 ft. high at back. Fine wire netting should be stretched across the corners of the inside. This will prevent the birds from crowding, and at the same time supply fresh air on all sides. The floor should be bedded with chaff or other such litter.

There are good and bad chick-foods being sold. Those who have no machine to grind the grains should purchase a reliable brand of prepared food, of which there is a very good one on the market. Chicks should be kept on the hungry side for the first few days, only allowing them what they will pick up in a few minutes. A good plan is to feel the chick's crop before feeding: if full it requires no more food for at least one hour.

Feeding wet mash to young chicks alternately is apt to bring on bowel-trouble; and, besides, they will not then eat dry mash when given them, and as a result will lose weight.

Do not let the chicks get wet. The drinking-vessels should be so arranged that the birds can reach the water with their beaks only. Clean water should be given from the start, and kept constantly before them. When chicks that have been properly fed drink to excess, it is a sure sign that they have been chilled or overheated. Chicks drink frequently, and an irregular supply is sure to have a bad effect on them.

MARKING CHICKS.

When a number of different strains and ages are kept, it is necessary to have some system of web-marking. A handy marker is illustrated. The chicks can be marked when leaving the incubator, and, with a register kept, different strains can thus run together.

NOTES TO PLATES ILLUSTRATING BURNHAM BROODER HOUSE.

THE IDEAL STOVE.

The pipes lie parallel, with an elevation calculated from the heater of 1 in. in 10 ft. The pipes nearest the heater are obviously the warmest, so that as the chicks are moved along they can consequently be hardened off by degrees. In order to further assist the hardening process several of the boxes at the far end of the house are constructed without fronts. Again, before moving the chickens to the cool brooder house, they should be shut out of the heating-chamber for at least three nights, when they will sleep against the front of the brooder. This lessens the risk of the chicks being chilled when moved to the intermediate house. The cover, as shown in the view on page 238, is placed on the pipes with a piece of felt or blanket nailed on the outer edge, and allowed to hang down 3 in. from the floor.

INSIDE RUNS.

An ordinary piece of spouting is set level and sufficiently high to prevent the chicks scratching the litter into it. The water is supplied by means of an ordinary tap. At one end of the spout have a large hole, and a tight-fitting plug, whereby the water can be run off. The spout should be kept thoroughly clean. An inclined approach to the trough, and made movable, is provided. This should be covered with tar and sand to prevent the chicks from slipping. The fuel used for heating the stove is coke or lignite, or both may be mixed. Ordinary coal is unsuitable, owing to the tar it contains causing the inside of the stove and the chimney-pipe to become clogged. The cost of running is about 5s. per week.

CORRESPONDENCE.

KEMP IN WOOL.

K. J., Morrinsville, writes,—

Could you give me through your correspondence column a definition of kemp as applied to wool ?

The Director of Live-stock and Meat replies,—

"Kemp," as applied to wool, signifies a kind of white hair similar to that of the Angora goat. It may be found to some extent throughout the fleece, but is more readily detected by examination of the wool on the breech of the sheep. It can be best prevented by judicious culling, and the careful selection of fresh blood into the flock.

CIDER.

R. B., Awahuri.—

Would you kindly furnish information as to the making of cider through your *Journal ?*

The Director of Orchards, Gardens, and Apiaries replies,—

The greatest care and cleanliness is necessary in its preparation. All utensils used—viz., vats, casks, shovels, funnels, &c., should be of wood, glass, or earthenware, as the acid of the apple dissolves the iron, and these utensils should be used for nothing else.

The apples must be ripe but not too soft, wine-acidy, and of good quality. Sweet apples are not suitable. The better qualities give the best wine. Sundry kinds can be mixed and a few acid-juicy pears added. It takes about ½ cwt. fruit to make an anker (8·493 gallons) of wine. After cleaning all vessels thoroughly, the fruit is washed and dried in baskets. Then pick out all bad or worm-eaten fruit, and squash remainder in a clean wooden trough with a heavy wooden stamper. If the trough is not filled up too much at a time this operation will be easier. Shovel the pulp at once into a vat, and let it stand until the next day, stirring it occasionally so that it takes in more oxygen. If you only make one anker of wine you can press the juice next day through a loose linen bag, otherwise a press is wanted.

The juice pressed out is put into a cask well cleaned with boiling, and afterwards rinsed with cold water. The remaining pulp is broken up next day, wetted with hot water, and pressed out again. The extract must obtained is added to the previous lot, and filled into a cask, the remainder into a stone jar. Keep both in a temperature of 57 to 64 degrees Fahr., and let ferment. The bunghole of the cask and opening of the jar are closed with a linen rag to keep off insects. When fermentation begins, in three or four days—in low temperature perhaps only in eight days—the froth has to be removed every day and the rags washed. When the froth stops the bunghole is stopped with a sand-bag, which keeps out the air, and the cask is filled up every day from the must fermenting in the jar. When the frothing has stopped the bunghole is closed loosely with the bung wrapped with clean linen, both well scalded, and fill up the cask once a week.

To prevent the must in the jar going bad it is advisable to fill it in bottles now, corking these up lightly. In eight to ten weeks it is advisable to rack off the wine, which is pretty clear now, into another cask, to filter the dregs, or to clear it in bottles.

In case there should not be sufficient must to keep the cask always quite full, as the quantity of the wine is considerably reduced by the yeast, sugar-water should

be added; but this should not happen, as care should be taken to keep sufficient must in reserve for filling up.

In the spring the wine in the new cask should have cleared sufficiently to be bottled off, and could also be consumed, but by keeping it until the autumn it will greatly improve in appearance and taste. But even in summer the apple-wine is a wholesome, agreeable, and refreshing drink. The main thing is not to add any spirits to it, apples in sufficient and good quality is the principal condition.

Should the apples contain less sugar and more acid, or should it be desirable to make a sweeter wine, about 10 grams of moist sugar is dissolved in the must before fermentation.

BEE-KEEPING.

M. B., Thames, writes as follows :—

(1.) When ordering beehives, what is the trade name of the most up-to-date hive; where can they be obtained; and from whom?

(2.) What are the most usual adulterants added to beeswax?

(3.) Is there any simple commercial formula for testing beeswax for purity and adulterations without subjecting it to thorough scientific analysis? For instance, for one item, the imported American foundation comb, I have been informed, is not entirely composed of pure beeswax. If this be intentionally or accidentally added to commercial beeswax, how can it be detected?

The Director of Orchards, Gardens, and Apiaries replies,—

(1.) The most up-to-date hive which we recommend is the dovetailed Langstroth, with two supers, ten frames to each. They may be obtained at the Alliance Box Company, 24 Castle Street, Dunedin, or from any of their agents, or Bagnall Bros., Auckland.

(2.) The most usual adulterants added to beeswax are paraffins with a high melting-point, also waxes of a mineral nature, such as ozokerit, vegetable waxes such as carnauba, others also that come from China and Japan. These have physical properties resembling beeswax, but their chemical compositions are quite different. Wax may also be adulterated with tallow, stearine, resin, mineral powders, kaolin, ochre, chalk, sulphate of baryta, gypsum, and even starch. Sometimes as much as 50 per cent. of these foreign substances are mixed with wax; the practice, however, is a very improper one.

(3.) The adulterations of wax are so difficult to detect that it is scarcely practicable for those who are not experts in analysing. The following tests may, however, be useful: (1.) Such inert substances as baryta, ochre, white-lead, kaolin, chalk, and gypsum can be detected by melting wax in boiling water and then thoroughly stirring it; the water becomes clouded, and after allowing it to stand for a short time the solid substances are precipitated. (2.) Another way is to dissolve the wax in ether, benzine, or spirits of turpentine. The solids will then be precipitated, and the amount of adulteration can then be judged by the quantity deposited. Place a piece of suspected wax in a test-tube with spirits of turpentine, and gently heat over a lamp. If the solution is imperfect or cloudy, or if a precipitate is formed, the wax is adulterated, for spirits of turpentine dissolves pure wax completely. (3.) To detect paraffin in wax, heat it with fuming sulphuric acid, which destroys the wax, converting it into a black jelly-like mass, while the paraffin is left as a transparent layer on the surface.

TO LEARN POULTRY-KEEPING.

A. W., North of Auckland. Mr. F. C. Brown furnishes the following reply to your communication :—

I would advise you to wait for the new issue of the Poultry Leaflet, which will give the information you desire. You would be well advised to make a small number

of fowls pay before carrying out your intention of keeping several hundred. The business cannot be learnt from the best book in existence. It will never pay you to grow grain for poultry. The Department can, as you surmise, supply you with either stock birds or sittings. Delighted to know you desire to commence with purebreds.

Diamond-back Moth.

A. W. Hogg, Masterton :—

I am enclosing a sample of cabbage-leaf taken from the garden of a well-known resident. He has several plots of cabbage all in a similar condition. Not only are the leaves skeletonized, but the hearts are eaten out of the plants. Can you suggest or recommend a remedy ?

Mr. A. H. Cockayne, Biologist, replies :—

The specimen indicates that the plant has been attacked by the diamond-back moth. This insect is the most serious pest of our turnip, rape, and allied crops, and is making the growing of turnips on an extensive scale a most precarious undertaking. On small areas spraying with arsenate of lead—1 lb. to 25 gallons of water—is effective if taken in hand before the caterpillars have done any extensive damage. Of course with a crop covering a large area this treatment is impracticable.

A Poultry Standard.

W. J. D , Hastings :—

There is no more available information beyond that which you have already seen.

RECORD PRICES AT BRITISH STOCK-SALES.

Britain, the stud farm of the world, is putting up fresh records. At the annual sale subsequent to the Shire Horse Show in London in February, the highest price ever reached at the sales was paid for a three-year-old stallion—1,175 guineas—fourth in his class at the show. For another three-year-old sire 401 guineas was paid, and a mare realized 350 guineas. At the Birmingham Shorthorn Show and sale a bull was sold at the great price of 1,500 guineas, Captain Graham Sterling being the seller and Mr. W. Duthie the purchaser. Lord Lovat secured an equal price for a yearling four years ago, but it was bought for export. A few months back £1,365 was paid for a Shorthorn bull calf at the Inverness sales.

His Majesty the King has again shown his interest in agriculture by donating a challenge cup, valued at £100, for annual competition at the Scottish National Fat Stock Club's Show. It will be given to the best animal exhibited in all classes.

Five thousand crates of rabbits from Melbourne, Australia (says *Cold Storage*) arrived in New York during January.

SHIPMENTS OF UNDERMENTIONED PRODUCE FROM NEW ZEALAND TO UNITED KINGDOM,

COMPILED FROM MANIFESTS OF VESSELS SAILED DURING RESPECTIVE MONTHS OF THE CURRENT AND PRECEDING SEASONS.

Month.		Mutton, Carcases.	Lamb, Carcases	Beef, Quarters.	Butter, Boxes.	Cheese. Crates.	Wool, Bales.	Wheat, Sacks.	Oats, Sacks.	Rabbits, Crates.	Hemp, Bales.	Tow, Bales.	Kauri-gum, Cases.	Sundry.
October,	1910	49,010	800	10,531	60,014	9,159	3,189	94,815	23,330	36,947	3,632	1,232	3,089	56 carcases pork.
	1909	*103,746*	*49,600*	*4,049*	*57,221*	*13,716*	*3,995*	..	*41,079*	*24,847*	*1,105*	*631*	*7,882*	..
November,	1910	62,926	29,877	5,554	105,759	27,749	55,551	76,594	331	28,646	6,850	2,300	4,339	911 carcases pork.
"	*1909*	*56,467*	*40,973*	*11,073*	*99,951*	*33,019*	*49,480*	..	*21,955*	*26,448*	*4,151*	*734*	*4,383*	..
December,	1910	82,405	157,172	13,155	182,051	67,162	59,080	..	..	9,716	4,524	109	5,363	686 carcases pork.
"	*1909*	*90,245*	*86,345*	*23,199*	*164,314*	*68,867*	*72,056*	..	*2,613*	*2,128*	*7,389*	*1,618*	*8,742*	..
January,	1911	175,337	287,120	13,568	90,405	46,375	127,199	..	16	399	15,234	3,302	7,094	590 carcases pork.
"	*1910*	*86,491*	*252,193*	*22,527*	*87,934*	*39,717*	*122,399*	*2,391*	*15,839*	*1,634*	*11,305*	*4,704*	*5,682*	..
February,	1911	242,090	450,406	24,924	86,368	46,667	70,030	23,694	200	..	4,428	1,302	2,113	1,369 carcases pork.
"	*1910*	*196,093*	*414,408*	*23,798*	*97,766*	*62,192*	*102,182*	*4,724*	*8,600*	..	*4,223*	*2,314*	*4,827*	*1,719* "
March,	1911	264,297	665,822	26,657	45,912	40,668	53,362	40,276	..	..	3,650	1,583	8,982	2,408 carcases pork.
"	*1910*	*222,058*	*413,179*	*22,134*	*77,319*	*42,029*	*64,266*	*2,899*	*3,636*	..	*9,152*	*2,490*	*2,959*	*798* "
April,	1910	209,120	559,166	20,355	46,524	44,032	32,920	21,855	1,934	12	10,179	2,951	4,250	627 carcases pork.
"	*1909*	*281,412*	*525,211*	*19,511*	*21,783*	*29,164*	*27,468*	*15,051*	*16,975*	..	*5,910*	*786*	*580*	..
May,	1910	310,196	622,232	38,276	9,588	28,384	25,123	81,052	..	3,010	10,017	2,346	3,150	1,293 carcases pork.
"	*1909*	*261,886*	*675,070*	*39,961*	*4,307*	*17,508*	*39,259*	*135,346*	*139,297*	*3,500*	*6,171*	*972*	*2,473*	..
June,	1910	299,596	555,777	60,286	485	17,963	21,260	13,707	..	8,988	6,180	2,684	7,104	658 carcases pork.
"	*1909*	*108,094*	*302,721*	*29,029*	*6*	*12,406*	*12,157*	*88,974*	*223,563*	*3,500*	*1,768*	*790*	*3,762*	..
July,	1910	240,906	334,753	71,160	..	595	12,816	20,604	1,106	8,649	6,695	1,437	8,272	2,448 carcases pork.
"	*1909*	*164,437*	*231,053*	*31,929*	*1,479*	*3,650*	*22,471*	*77,909*	*170,701*	*5,473*	*4,429*	*633*	*10,260*	..
August,	1910	94,468	97,899	16,440	634	..	5,381	33,970	273	22,629	1,378	720	6,793	362 carcases pork.
"	*1909*	*63,219*	*117,316*	*41,029*	*3,601*	*1,721*	*6,575*	*27,207*	*234,998*	*9,149*	*2,348*	*1,286*	*887*	..
September,	1910	104,925	26,416	8,420	22,644	41	6,539	40,876	3,863	7,721	2,680	597	1,682	255 carcases pork.
"	*1909*	*70,815*	*73,827*	*22,272*	*9,886*	*974*	*6,575*	*1,040*	*62,372*	*40,006*	*1,352*	*484*	*10,325*	..

HEMP AND TOW GRADING RETURNS.

MARCH, 1911.

Hemp.—The total number of bales graded was 9,270, as compared with 14,540 for the corresponding month of last year, a decrease of 5,270 bales. For the twelve months ending 31st March the number graded was 113,528, as compared with 104,034 for the previous twelve months, or an increase of 9,494 bales. Worked out on a percentage basis the quantity of each grade dealt with during the month was as follows: Superior, nil; fine, 5·39; good fair, 42·96; fair, 48·75; common, 2·73; rejected, 0·13; condemned, 0·4: total, 100.

Tow.—During the month 2,480 bales were dealt with, as compared with 4,833 for the corresponding month of last year, a decrease of 2,353 bales.

HEMP AND TOW GRADED THROUGHOUT THE DOMINION DURING THE MONTH OF MARCH, 1911.

Hemp.

Port.	Superior.	Fine.	Good Fair.	Fair.	Common.	Rejected.	Condemned.	Total.
	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	..	174	601	61	..	..	836
Napier ..	..	..	157	16	..	..	..	173
Foxton ..	..	169	1,641	1,729	60	12	4	3,615
Wellington ..	..	140	1,838	1,498	31	..	..	3,507
Blenheim ..	..	..	..	..	..	..	..	..
Picton ..	..	165	24	..	..	..	..	189
Lyttelton ..	..	..	..	..	..	..	..	..
Dunedin ..	..	26	96	235	99	..	..	456
Bluff ..	..	..	52	440	2	..	..	494
Totals ..	..	500	3,982	4,519	253	12	4	9,270
Percentages of total	..	5·39	42·96	48·75	2·73	0·13	0·4	100

Tow.

Port.		First Grade.	Second Grade.	Third Grade.	Condemned.	Total.
		Bales.	Bales.	Bales.	Bales.	Bales.
Auckland	..	..	101	58	22	181
Napier ..	..	..	..	..	..	..
Foxton ..	..	171	577	125	..	873
Wellington	..	321	613	63	1	998
Blenheim	..	6	..	..	..	6
Picton ..	..	39	35	..	..	74
Lyttelton	..	..	..	..	..	..
Dunedin	..	..	98	..	..	98
Bluff ..	..	..	8	190	52	250
Totals	..	537	1,432	436	75	2,480

THE BRITISH PRODUCE-MARKET.

HIGH COMMISSIONER'S CABLED REPORTS.

THE Commerce and Tourists Division of the Department of Agriculture, Commerce, and Tourists has received the following cablegrams from the High Commissioner for New Zealand, London. Quotations, unless otherwise specified, are average market prices on spot.

18th March, 1911.

Mutton.—The market is quiet, with a tendency in favour of buyers. Canterbury 3¾d., North Island 3⅜d., Australian 2¾d., River Plate 2⅞d., per lb.

Lamb.—The market is dull; there is a dull sale for all lamb. Canterbury 5⅛d., other than Canterbury 4⅝d., Australian 3¾d., River Plate 3⅞d., per lb.

Beef.—The market is firm, with more inquiry. Stocks of New Zealand beef on hand are light. New Zealand hinds 3⅞d., New Zealand fores 3⅛d. per lb.

Pork.—The market is weaker, though not actually lower—5¼d. per lb.

Butter.—The market is quiet, but firm for best quality. Choicest New Zealand 106s., Australian 102s., Danish 120s., Siberian 104s., per cwt.

Cheese.—The market is firm, and there is a general and active demand. White 60s., coloured at same price.

Hemp.—The market is firmer. New Zealand good fair £20 10s., fair grade £20, fair current Manila £19 10s., per ton on spot. These quotations are for all positions. The output from Manila for the week was 26,000 bales.

Wool.—The market remains firm, and competition is well sustained.

Kauri-gum.—The market is quiet, but holders are firm for best qualities. Ordinary to fair three-quarter-scraped, £8 10s. Fair half-scraped, £5 2s. 6d. Brown fair half to three-quarter scraped, £4 5s. Brown pickings, common to good, £2. Bush fair to good pale and amber, scraped, £8 2s. 6d. Stock, 300 tons.

26th March, 1911.

Mutton.—The market is quiet; there has been more inclination to purchase mutton during the past week, on account of the low price. Canterbury 3¾d. (nominal), North Island 3¼d. (a small supply), per lb.

Lamb.—The market is becoming more depressed, on account of stocks accumulating. Canterbury 5d., other than Canterbury 4½d., per lb.

Beef.—The market is firm. Supplies of American chilled beef are small. New Zealand hinds 4d., fores 3⅛d., per lb.

Pork.—The market is firmer—5¼d. per lb.

Butter.—The market remains firm for best quality, but weak and inactive for second class. Choicest New Zealand 106s., Danish 120s., Siberian 102s., Australian 102s., per cwt.

Cheese.—The market remains firm. New Zealand white and coloured 60s. per cwt.

Hemp.—The market is slightly weaker, with less demand. New Zealand good fair £20, fair grade £19 10s., fair current Manila £19 5s. on spot, per ton. Forward shipment at the same price. Output from Manila for the week was 38,000 bales.

Cocksfoot-seed.—The market is firm, with an improved demand.

Wool.—The market is strong in tone, owing to the business which has been done.

1st April, 1911.

Mutton.—The market is weak. Trade for all classes of mutton has been very slow, and prices are barely maintained. There is an inclination to force sales of mutton. Canterbury 3⅝d., North Island 3⅛d., per lb.

Lamb.—The market is dull. Canterbury 4⅞d., other than Canterbury 4¼d. per lb.

Beef.—The market is firm. Stocks of New Zealand beef on hand are light. New Zealand hinds 4⅛d., New Zealand fores 3⅛d., per lb.

Pork.—The market is quiet, but steady. A limited supply—5¼d. per lb.

Butter.—The market is quiet, but firm. Choicest New Zealand butter 108s., Australian 102s., Danish 118s., Siberian 102s., per cwt.

Cheese.—The market is quiet, but holders are firm. New Zealand 61s. per cent.

Hemp.—The market is very quiet, nothing doing. New Zealand good fair £20, fair grade £19 5s. on spot, per ton. Forward shipment at the same price. Fair current Manila £18 15s. on spot per ton. Forward shipment £19. The output from Manila for the week was 24,000 bales.

Cocksfoot-seed.—The market is firm. There are light stocks of cocksfoot-seed on hand. Buyers have been offering for cocksfoot-seed more freely. Average price bright, clean New Zealand cocksfoot-seed weighing 17 lb. per bushel 76s., per cwt.

8th April, 1911.

Mutton.—The market is depressed. Stocks of mutton on hand are heavy, but consumption is increasing. No change in prices—viz., Canterbury 3⅝d., North Island 3⅛d., per lb.

Lamb.—The market is firmer, and there is a better demand, although arrivals are very heavy, and stocks are accumulating. Canterbury 4⅞d., other than Canterbury 4¼d., per lb.

Beef.—There has been no alteration in the beef market since last week—viz., New Zealand hinds 4⅛d., fores 3⅛d., per lb.

Butter.—The market is firm for best quality. A dull market for second-class quality, of which present supplies exceed requirements. Choicest New Zealand butter 108s., Australian 102s., Danish 120s., Siberian 104s., per cwt.

Cheese.—The cheese market is very firm, and there is a general and active demand. New Zealand cheese 62s. per cwt.

Hemp.—The market is unchanged—viz., New Zealand good fair on spot £20, fair grade £19 5s., fair current manila £18 15s., per ton. Forward shipment: New Zealand good fair £20, fair grade £19 5s., fair current Manila £19, per ton. The output from Manila for the week was 31,000 bales. Stock of New Zealand hemp, 606 tons.

Mutton and Lamb.—River Plate shipments received during March, 1911, are as follow:—

	Mutton. Carcases.	Lamb. Carcases.
London	39,073	11,529
Liverpool	128,161	24,736
Southampton	4,250	..
Hull	1,163	239
Newcastle	23,207	1,325
Cardiff	7,706	812
Bristol	4,352	..
Ireland	2,934	1,623
	210,846	40,264
March, 1910	169,747	29,533

Wheat.—The market is dull, and supplies are small. New Zealand wheat, long-berried, *ex* granary, per quarter of 496 lb., 32s.

Oats.—The demand is falling off. New Zealand oats, short sparrow-bills, *ex* granary, per quarter of 384 lb. 18s., Danish, per quarter of 320 lb., 16s.

Beans.—There is little demand. New Zealand beans, f.a.q., old crop, per 504 lb., 34s.

Peas.—The market is very quiet, and there is nothing doing. New Zealand peas (partridge), per 504 lb., 42s.

15th April, 1911.

Mutton.—The market is quiet. Trade is very disappointing, there being only a very hand-to-mouth demand. Canterbury 3⅝d., North Island 3⅛d., per lb.

Lamb.—There is good demand, on account of Easter. Canterbury 5d., other than Canterbury 4⅜d., per lb.

Beef.—The market is depressed on account of supplies of River Plate beef being heavy. Supplies of American chilled beef are large. New Zealand hinds 4d., New Zealand fores 2⅞d., per lb.

Butter.—The market is very firm for best quality. Choicest New Zealand butter, 109s. per cwt.

Cheese.—The cheese market is very firm. New Zealand, 63s. per cwt.

Kauri-gum.—The market is quiet, and small business doing. Ordinary to fair three-quarter-scraped, £8 10s. Fair half-scraped, £5 5s. Brown fair half to three-quarter scraped, £5. Brown pickings common to good, £2. Bush fair to good pale and amber, scraped, £8 5s. Stock, 309 tons.

22nd April, 1911.

Mutton.—The market is dull, owing to a poor demand. Canterbury, 3⅝d. per lb. (a small supply); North Island, 3d. per lb. (a large supply); River plate, 2⅞d. per lb. (is in large supply, and is being strongly pushed for sale).

Lamb.—The market is a shade weaker as a result of heavy arrivals, and large shipments are expected. Stocks of lamb are accumulating. Canterbury, 4⅞d., other than Canterbury 4⅛d., Australian 3⅝d., River Plate 3¾d., per lb.

Beef.—The market is quiet, with a tendency in favour of buyers. Supplies of River Plate are heavy. New Zealand hinds 4d., fores 2⅝d., per lb.

Butter.—The market remains firm. Choicest New Zealand 109s., Australian 102s., Danish 116s., Siberian 102s., per cwt.

Cheese.—The market is quieter, but we have a favourable opinion of New Zealand at 62s. 6d. per cwt. American offerings in moderate quantities, about 60s. per cwt.

Hemp.—The market is dull. New Zealand good, fair, spot, £20, fair grade £19 per ton. Forward shipment about the same price. Fair current Manila, spot, £19; forward shipment, £19 5s. per ton. The output from Manila for the week was 29,000 bales.

Cocksfoot-seed. The market is firm, and there is a better demand. Bright clean New Zealand cocksfoot-seed weighing 17 lb. per bushel, 77s. per cwt.

Pork. —5½d. per lb. (nominal).

Eggs. -The market is quiet but firm, moderate supplies going forward. Italian 7s. 9d. to 9s., Danish 7s. 6d. to 9s. 6d., Hungarian 5s. 9d. to 7s. 3d., Russian 5s. 9d. to 6s. 9d. per 120.

Poultry.—The market is quiet but steady. American chickens 8d. to 9d., Russian 7½d. to 8½d., ducklings 6d. to 7d., turkeys 7d., per lb.

Wool. -The market remains firm.

LONDON WOOL SALES.

The Commerce and Tourists Division of the Department has received the following cablegram from the High Commissioner, dated London, 1st April, 1911, regarding the closing of the second series of colonial wool-sales:—

Wool-sales closed to-day. There is great competition. Market firm at the advance for all descriptions. Prospects are favourable. 21,000 bales of New Zealand wool are held over. Estimated values: Superior merino, 1s. to 1s. 2d.; medium, 10d. to 11½d.; inferior, 8d. to 9½d.; fine crossbreds, all grades, 11½d. to 1s. 2d.; medium, 9d. to 11d.; coarse, 8½d. to 10d.

LONDON PRICES OF POULTRY.

The London officer of the Live-stock and Meat Division reports, under date of 7th February. Following are the current wholesale prices on the Smithfield Market of poultry, ducks, and turkeys:—

Surrey chickens, best quality, 1s. per lb.; Boston chickens, best quality, 10d. per lb.; American chickens, none on market: Russian chickens, 8½d. per lb.; ducks, frozen, Chinese, 6½d. per lb.; ducks, frozen, Russian, 8d. per lb.; turkeys, English (very few on market), worth about 10½d. to 1s. per lb.; turkeys, Italian, 9d. per lb.; turkeys, Russian, 8½d. per lb.

Since writing the above I learn that American chickens are arriving in Liverpool in splendid condition, and are fetching 9½d. per lb. corn-fed, and 10d. per lb., fatted.

SALT BEEF.

In a communication to the Director of the Live-stock and Meat Division, Mr. C. J. Reakes, the London Officer of the Division, Mr. A. Crabb, writes: "When in Glasgow I was told by one of the Inspectors there that one or two firms were, on account of reduced imports from the States, feeling a shortage of good-quality salt beef for ships' stores. What is wanted is prime briskets and plates well packed."

It is generally admitted in the trade at Home that New Zealand meat found its way at the low prices ruling in 1909 into fresh channels, and thus stimulated the demand to no small extent, the benefit of this having been most obviously felt during this last season. There can be little doubt about this (says the *Meat Trades' Journal*), for in spite of the greatly reduced exports from here and other parts of New Zealand, l mb has sold steadily throughout the 1910 season at values which, on the whole, must have returned excellent results to New Zealand producers.